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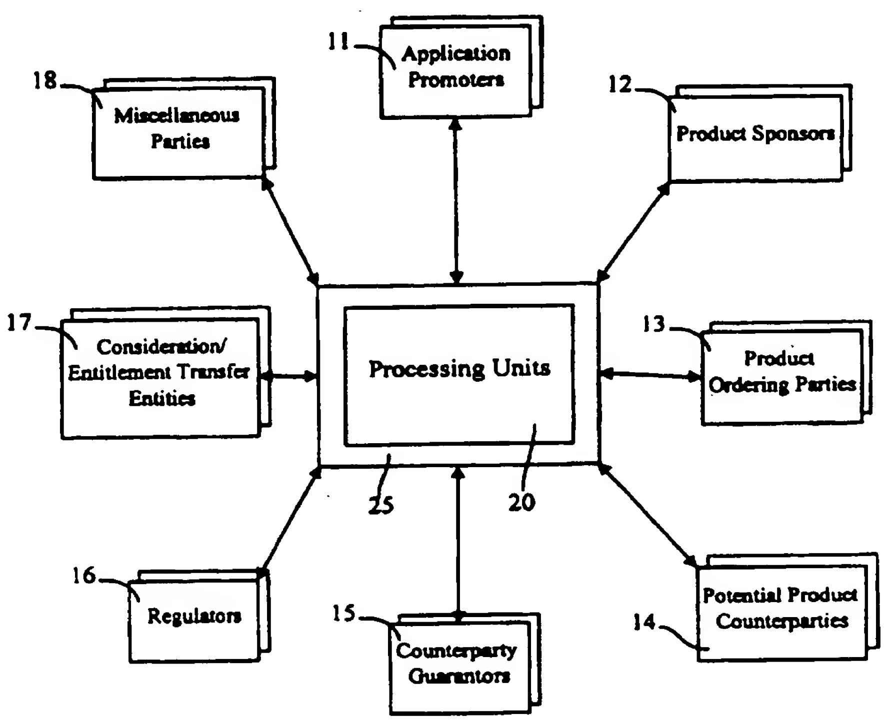
(54) Title: METHODS AND APPARATUS RELATING TO THE FORMULATION AND TRADING OF RISK MANAGEMENT CONTRACTS

(57) Abstract

The formulation of multi-party risk management contracts is described. An ordering party (13) inputs, by a data processing device (51), contract data representing an offered contract in a predetermined phenomenon, the phenomenon having a range of possible outcomes at a time of maturity, and the contract data specifying the same entitlement for each outcome due to the ordering party at maturity and a consideration due to a counterparty. The potential counterparties (14) input, by data processing means (51), registering data relating to the range of possible outcomes for the predetermined phenomenon. An offered contract is priced by data processing apparatus (20) by the steps of calculating a counter consideration from each counterparty's registering data and comparing the ordering party consideration with the calculated counter considerations. A match is made on the basis of the comparison.



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Methods and Apparatus Relating to the Formulation and Trading of Risk Management Contracts

Field of the Invention

The present invention is directed to methods and apparatus relating to the formulation and trading of risk management contracts. Reference also is made to commonly-owned International Patent Application No. PCT/AU93/00250 that discloses similar methods and apparatus. The contents of the noted International application are incorporated herein by cross-reference.

Background of the Invention

International Application No. PCT/AU93/00250 describes that individuals and enterprises are continually exposed to risk because of future events beyond their control. The outcome of those events can positively or negatively impact on their wellbeing. Individuals and enterprises generally prefer not to face exposure to the possibility of adverse consequences, regardless of their perception of the likelihood of such events occurring. It is in their interest to consider foregoing 'resources' they currently possess if doing so would reduce the possibility of being exposed to future outcomes.

Risk can take many forms in view of the large range and type of future events which might result in adverse consequences. Risk that can be categorised as being economic in nature includes: commodity prices, currency exchange rates, interest rates, property prices, share prices, inflation rates, company performance and market event based indices.

The capability to manage risk is becoming more important with the progression of time because there is an ever increasing exposure to a wider generic range of future phenomena beyond the control of individuals or enterprises. There is also a wider

feasible range of possible future events, and greater uncertainty about the likelihood of occurrence associated with any single future phenomenon, viz., an increasing volatility.

In the face of economic risk, it is known for individuals and enterprises to hedge against adverse outcomes by indirect means such as self-insurance, and directly by means such as futures contracts, forward contracts and swaps. There are disadvantages or limitations associated with such available economic risk management mechanisms. Particularly, they provide at best only indirect approaches to dealing with the risk management needs. The available mechanisms are relatively expensive and provide limited phenomenon coverage, and therefore cannot meet the requirements of the party seeking to hedge against such wide-ranging future risk. The infrastructure and pay-out costs associated with switching between, say, a commodities market and a stock market are often prohibitive for entities small and large alike. As a consequence, entities find themselves saddled with obligations they have little control over and cannot escape.

International Application No. PCT/AU93/00250 also describes a number of examples of prior art patents that deal with various forms of risk management.

The invention of International Application No. PCT/AU93/00250 can be summarised as risk management contract formulation comprising the steps of order placement, pricing and matching. An ordering party initiates contract formulation by submitting an order that relates to a specified phenomenon that has a range of possible outcomes relative to a future date of maturity. The ordering party specifies elemental entitlements (pay-outs) due at maturity relative to the phenomenon's actual outcome, and a maximum consideration to be paid to a counterparty on matching of a contract. Independently, potential counterparties have submitted registering data based on their assessed probability of each possible outcome at maturity for the phenomenon in question. From this counterparty registering data, a data processing system then seeks to price each counterparty against the ordering party's specified entitlement. Broadly speaking, this involves multiplying each of the elemental ordering party entitlements

with the corresponding counterparty probability and summing the results to derive counter considerations. The counter considerations must fall below the ordering party's maximum consideration for there to be the possibility of a match. Most usually a match will be made between the ordering party and the counterparty having the lowest counter consideration. At all times during contract pricing and matching the identity of the counterparties remains unknown to the ordering party, thus being in the nature of a 'blindfold' transaction.

Summary of the Invention

The present invention is directed to improvements in the formulation of risk management contracts. In one broad form, the invention provides that the phenomenon for an offered contract is specified such that the elemental entitlements for the range of outcomes are the same for each outcome. In mathematical terms this corresponds to a shape in an x-y cartesian coordinate system where entitlement value (y) with respect to the outcome values (x) is a flat line. Put another way, the entitlement vs. outcome (y,x) shape has zero gradient ($\Delta y/\Delta x$). This type of entitlement/outcome shape can be thought of as a form of lending (if the entitlement is positive, or borrowing if the entitlement is negative), in that the ordering party wishes to make the consideration available for lending now, having the expectation of receiving a known (non-contingent) entitlement in the future. Contract pricing and matching with a counterparty proceed as before.

Therefore, the invention discloses a data processing system to enable the formulation of multi-party risk management contracts, the system comprising:

input means by which an ordering party can input contract data representing an offered contract for a predetermined phenomenon, the phenomenon having a future range of possible outcomes at a time of maturity, and said contract data specifying the same entitlement for each said outcome due to the ordering party and a consideration

due to a counterparty, and at least one counterparty can input registering data for said predetermined phenomena; and

data processing means for pricing and matching contracts from said contract data and said registering data, said pricing including calculating a counter consideration from each said registering data, and said matching including comparing said consideration with each said counter consideration to match an offered contract with at least one of said counterparties.

Preferably, the entitlement is due at maturity.

The invention further discloses a method to enable the formulation of multi-party risk management contracts, the method comprising the steps of:

(a) inputting to data processing apparatus, by input means, ordering party contract data representing an offered contract for a predetermined phenomenon, the phenomenon having a range of possible outcomes at a time of maturity, said contract data specifying the same entitlement for each said outcome due to the ordering party and a consideration due to a counterparty;

(b) inputting to said data processing apparatus, by input means, counterparty registering data relating to the range of possible outcomes for said predetermined phenomenon; and

(c) pricing and matching the offered contract, by the data processing apparatus, comprising the steps of:

(i) calculating a counter-consideration from each counterparty registering data;

(ii) comparing said consideration with each said counter-consideration; and

(iii) matching the contract on the basis of the comparison.

Preferably, the consideration is paid to/from the ordering party on match of the contract. Furthermore, payment of the entitlement to/from the ordering party can occur on maturity of the contract.

In another broad form, the invention provides that an offered contract does not specify any phenomenon, and thus there is no range of possible outcomes, rather an ordering party specifies only a single (non-contingent) entitlement due at maturity. The counterparty data thus is directly the counter consideration. This form of the invention is in the nature of an exchange of consideration now for a known (non-contingent) entitlement.

Therefore, the invention further discloses a data processing system to enable the formulation of multi-party risk management contracts, the system comprising:

input means by which an ordering party can input contract data specifying an entitlement due to the ordering party and a consideration due to a counterparty, both the entitlement and the consideration being due on match of a contract, and at least one counterparty can input counter considerations for the contract relevant to a range of possible entitlements; and

data processing means for matching a contract from said consideration and the counter consideration for the specified entitlement by comparing said consideration with each said counter consideration to match an offered contract with at least one of said counterparties.

The invention further discloses a method to enable the formulation of multi-party risk management contracts, the method comprising the steps of:

(a) inputting to data processing apparatus, by input means, ordering party contract data specifying an entitlement due to the ordering party and a consideration due to a counterparty, both the entitlement and the consideration due on match of a contract;

(b) inputting to said data processing apparatus, by input means, counterparty counter considerations for the contract relevant to a range of possible entitlements; and

(c) matching the offered contract, by the data processing apparatus, comprising the steps of:

(i) comparing said consideration with said counter consideration for the specified entitlement; and

(ii) matching the contract on the basis of the comparison.

The date of maturity can be the moment the contract is matched.

In this and all of the preceding cases, the consideration and the entitlement need not be the same form (denomination) of 'money'.

The registering data preferably is the assessed probability of occurrence of each possible outcome for the phenomenon. The assessed probabilities can sum to, or be greater than one over the range of possible outcomes.

The counterparty registering data can include a discount rate specified by each counterparty and applied to the respective calculated consideration to give a net counter consideration. Further, a commission rate can be specified by each counterparty as a part of the registering data.

In preferred embodiments, the entitlement can be in the form of 'money' payoffs (both positive and negative) at maturity of a matched contract, or in the form of goods, services, promises, credits or warrants. The consideration, whether ordering party specified or counterparty calculated, can again be in the nature of a premium or payments, or can relate to other 'non-money' forms of property or obligations, typically transferable when a contract is matched, although possibly deferrable until, and potentially beyond, the time of maturity.

In the period between the match of a contract and maturity the various ordering parties, counterparties and other contract stakeholders can review any contract to which they are a party and seek to trade that contract to other parties by the pricing and matching procedure, or variations on the pricing and matching procedure. They would tend to do so if their view of the future outcome of the phenomenon, being the subject of the contract, had changed markedly, or as a means to minimise expected losses if some unforseen adverse trend in the present day outcome of the phenomenon had occurred. As well as trading existing contracts, further contracts can be offered to 'lay

off' or avert risk. Stakeholder parties can build up a portfolio of matched contracts and offered contracts, which are continually traded to obtain the best possible position at any time, and that position can be continually reviewed with time.

It is further contemplated that both matched and offered contracts be based on the difference between phenomena, and so manage perceived risk as between the phenomena. Elemental contract phenomena can therefore be developed to meet the most particular needs of ordering parties and counterparties, thus creating great flexibility.

In most instances the date of maturity will be predetermined by a 'product sponsor' stakeholder. Even so, it is conceivable that the date of maturity can be tied to a specified time from the instant a contract is matched. This may be appropriate where the time of maturity is in the near future, in which case offered contracts could otherwise remain unmatched following initial offer even up until the time of maturity.

Other stakeholders have executive roles in administration, guaranteeing the performance of ordering parties and counterparties, regulation, supervision and so on. In this way the number and types of ordering parties and counterparties that can be considered in pricing and matching offered contracts can be controlled.

For all of the above-described cases, and for the case of contract formulation described in International Application No. PCT/AU93/00250, ordering parties must form some view about the entitlement required (whether contingent or non-contingent upon an outcome of a phenomenon) and the consideration to offer for a particular entitlement(s). In a similar way, counterparties (commonly referred to as participating parties) must form a view of the relative likelihood of occurrence of the outcome(s) in order to allow a counter consideration to be derived in the pricing procedure. It would be beneficial for ordering parties and counterparties alike to be able to call upon a decision support facility that can assist in the formulation of ordering party submission data and counter party registering data, based more generally on perceived attitudes and objectives.

Therefore, the invention discloses a data processing system to enable the management of risk by the formulation of risk management contracts, the system comprising:

data input means by which participating parties can input data concerning at least one predetermined phenomenon, each phenomenon having a range of possible outcomes and a future time of maturity, and

data processing means, coupled to each input means, for pricing and matching contracts between participating parties, and wherein each contract is priced and matched on the basis of offering data specifying entitlements due at maturity for the range of possible outcomes for one or more of said phenomena, and registering data of the likelihood of each outcome in said predetermined range of outcomes at maturity for one or more of said phenomena, said offering data and said pricing data being derived from said participating party data.

The participating party data can further include offering data and/or pricing data.

Preferably, said pricing includes calculating a counter consideration derived from said likelihoods, and said matching including comparing said consideration and said counter-consideration to match said offering data with one or more of said registering data.

The invention also discloses a method for enabling the management of risk by the formulation of risk management contracts, the method comprising the steps of:

participating parties inputting, by at least one data input means, data concerning at least one predetermined phenomenon, each said phenomenon having a range of future outcomes and a future time of maturity; and

pricing and matching contracts between participating parties, by data processing means, whereby each contract is priced and matched on the basis of offering data specifying entitlements due at maturity for the range of possible outcomes for one or more of said phenomena, and registering data of the likelihood of each outcome in

said predetermined range of outcomes at maturity for one or more of said phenomena, said offering data and said pricing data being derived from said participating party data.

Preferably, said pricing including the step of calculating a counter-consideration derived from said likelihoods, and said matching including the step of comparing said consideration and said counter consideration to match said offering data with one or more of said registering data.

Preferably, for both the system and method, the participating party attitude can be derived as only registering data, or as both registering data and offering data.

Advantageously, the derivation from participating party attitude to registering data and/or offering data is algorithmic, based on one or more of forecasts, objectives, perceived phenomena exposure and contract status information.

The attitudes can include participating party forecasts, in one embodiment being probabilities of occurrence of the future phenomena. The attitudes can further include participating party objectives concerning particular desired contracts, products and consideration payment minimum and maximum values. The attitudes further can include perceived phenomenon exposures.

Participating parties also can be provided with information concerning submitted, priced or matched contracts by the data processing means.

The invention retains the notion of stakeholders as ordering parties and order counterparties, although because individual participating parties can fulfil the roles of an ordering party, a counterparty or both an ordering party and a counterparty, as least some of the participating parties must be acknowledged as a registered product counterparty.

The invention thus can accommodate multiple participating parties and other interested/registered stakeholders, these being application promoters, product sponsors, guarantors, asset transfer entities, regulators and other miscellaneous entities of various types.

What differentiates ordering parties from counterparties is the notion of contract order initiation. Ordering parties initiate new contract orders, and counter-parties are the potential matching "acceptors" of the contract orders. They fulfil this role by continually submitting order pricing and limit conditions to the system.

Generally, all counterparties can be ordering parties but not all ordering parties can be counterparties. This is because counterparties need to be recognised by ordering parties as having the capacity to always make good on their future contract liabilities.

In addition to initiating new contract orders (in the case of ordering parties) and continually submitting contract order pricing and limit conditions to the system (in the case of counter-parties) all participating parties can also:

(a) sell to any other participating party the (positive or zero payoff portion) of a confirmed contract it is a party to,

(b) purchase from any other participating party the (positive or zero payoff portion) of a confirmed contract offered for sale by some other participating party,

(c) purchase or write an option to be a party to a new contract,

(d) exercise a purchased option to be a party to a new contract,

(e) purchase or write an option to buy/sell (the positive or zero payoff portion of) and existing contract,

(f) exercise a purchased option to buy/sell (the positive or zero payoff portion of) an existing contract,

(g) withdraw submitted but as yet unexecuted transactions of all the above-mentioned types, and

(h) submit pricing-enquiry orders with respect to all of the above-mentioned transaction types.

Embodiments of the invention significantly advance the state-of-the-art of formulating and trading risk management contracts. Essentially, this is achieved by a computing/telecommunications infrastructure that is capable of being accessed

worldwide by any enterprise/individual having access to a computer and telephone network. Furthermore, a virtually infinite number and range of risk typescan be accommodated. One embodiment presents itself in a form that assists users in making consideration-entitlement (insurance-type) trade-off decisions and provides a blind yet transparent price-discovery and trading process. Through its capability to create special case lending/borrowing and exchange products, end users are also provided with a low-cost mechanism for pricing and acquiring these products without the involvement of traditional intermediaries.

Brief Description of the Drawings

Fig. 1 is a schematic block diagram of a generic system embodying the invention;

Fig. 2a is a schematic block diagram of an indicative hardware platform supporting the system of Fig. 1;

Fig. 2b is a schematic block diagram of an alternate hardware platform supporting the system of Fig. 1;

Fig. 3 shows a timeline applicable to Example I;

Fig. 4 shows a timeline applicable to Example II;

Fig. 5 shows a timeline applicable to Example III;

Fig. 6 shows a modified form of the schematic block diagram of Fig. 1;

Fig. 7 shows a block diagram of the flow of information in one embodiment;

Fig. 8 shows a block diagram of the flow of information in another embodiment; and

Fig. 9 shows a processing cycle of an embodiment.

Description of Preferred Embodiments and Best Mode of Performance

Fig. 1 shows a block diagram of the generic system 10 embodying the invention. The various stakeholders or parties to the system 10 each have access to a

centralised processing unit 20. The processing units 20 can be constituted by one or more data processing apparatus, with each one thereof providing access for any one or more of the various stakeholders to applications software supported by the system 10, as all the processing units are interconnected. Access to the one or more data processing apparatus is controlled by a generic form of communications co-ordination and security processing unit 25.

Fig. 1 also indicates that there are a number of types of stakeholder, and a number of individual stakeholders within each stakeholder type. The basic types of stakeholder are described as: applications promoters 11, product sponsors 12, product ordering parties 13, potential product counterparties 14, counter-party guarantors 15, regulators 16, consideration/entitlement transfer ('accounting') entities 17, and miscellaneous parties 18. The number of types of stakeholder represented in Fig. 1 is typically the largest that will be supported by the system 10.

An embodiment of a computer system for the system 10 is shown in Fig. 2a. The core of the system hardware is a collection of data processing units. In the embodiment described, the processing unit 20 comprises three inter-linked data processors 93,97,104, such as the Sun 670 MP manufactured by Sun Microsystems, Inc. of the USA. Each processing unit 93,97,104 runs operational system software, such as Sun Microsystems OS 4.1.2, as well as applications software. The processor configuration shown in Fig. 1 represents a large system designed to handle the transactions of thousands of stakeholders, the input and output data generated by those stakeholders, and risk management contract pricing, matching and subsequent processing functions.

Each processing unit 93,97,104 is operably connected with it one or more mass data storage units 95,100,110 to store all data received from stakeholders, and other data relating to all other software operations generating or retrieving stored information. Suitable mass storage units are, for example, such as those commercially available from Sun Microsystems.

A number of communications controllers 80,84,87, forming the communications co-ordination and security processing unit 25, are coupled with the processing unit 20. These controllers effect communications between the processing units 93,97,104 and the various external hardware devices used by the stakeholders to communicate data or instructions to or from the processing units. The communications controllers are such as the Encore ANNEX II, the IBM AS/400 server or the CISCO Systems AGS +.

A large range of communications hardware products are supported, and collectively are referred to as the stakeholder input/output devices 70. One amongst many of the communication devices 70 are personal computers 51 and associated printers 52, which have communications connection with the communications controller 80 by means of a modem 50. There can also be an external host device 53, such as a mini or mainframe computer, again linked with the communications controller 80 by means of a modem 54. In other forms, communications can be established simply by means of a tone dialling telephone 56, which provides for the input of instructions or data by use of the tone dialling facility itself. In the alternative, a voice connection via an operator 75 can be effected by a conventional telephone 58. Both these external devices are shown connected with the communications controller 84. A further possibility is to have data transfer by means of a facsimile machine 65, in this case shown linked to the communications controller 87.

In all cases, users of the input devices are likely to be required to make use of system access password generation and encryption devices such as the Racal RG 500 Watchword Generator 66,67,68,69, (for personal use) and the Racal RG 1000, which is incorporated in a mainframe computer 53. The corresponding decoding units for these devices are incorporated in the communications controllers 80,84,87.

The generic processing unit 20 also includes a large number of 'portable' information recordal devices, such as printers, disc drives, and the like, which allow various forms of information to be printed or otherwise written to storage media to be

transferable. This is particularly appropriate where confirmatory documentation of matched risk contracts is required to be produced, either for safekeeping as a hard copy record, else to be forwarded to any one or more of the stakeholders that are a party to each individual matched contract.

The generic system 10 shown in Fig. 1 encompasses many varied configurations, relating not only to the number and types of stakeholders, but also the 'architectures' realisable by the system hardware and software in combination. In that sense the arrangement shown in Fig. 2a is to be considered only as broadly indicative of one type of hardware configuration that may be required to put the system into effect.

For example, Fig. 2b shows an alternate configuration that does not rely upon a centralised (hub) data processing unit, rather the necessary processing is performed locally at each stakeholder site 200_n by means of distributed software.

The formulation, pricing, match and subsequent management of risk management contracts will now be described with reference to three examples.

Life Cycle of Risk Management Contract: Example I

This example is taken from International Application No. PCT/AU93/00250, and describes formulation of a contract to manage risk associated with potential future movements in the value of a specified index of share prices (termed the PTSE 75 index). In summary, the example shows how one party (such as an institutional fund manager) can seek to avoid the adverse consequences of a significant decline in the future value of the PTSE 75 index (specifically a decline by June 1996), relative to the assumed current (June 1991) value of the index to make a contract with another unknown party, such as another fund manager seeking to avoid the adverse consequences of a significant corresponding increase in PTSE 75 index value.

The specific contract offering is one which provides an ordering party with a specified contingent entitlement to a compensatory Australian dollar future payout upon

payment of an up-front consideration money amount by the ordering party to the as-yet-unknown counterparty. The future money entitlement is contingent on the value, at contract maturity date, of the independently-determined value of the PTSE 75 index.

In this example, the relevant key stakeholders are: an application promoter (BLC Inc), various product sponsors (the relevant one for the example being BLC Inc itself), various product ordering parties (the relevant ones for the example being Abbotts & Taylor and Shearer & Associates), various potential counterparties (the relevant ones for the example being Abrahamsons and Carpenters Inc), a counterparty guarantor (CNZ Banking Corporation) and an application regulator (the Pacific Central Bank).

A timeline depicting the steps in the contract from the first step (Application Specification) to the final step (Contract Settlement) is shown in Fig. 3. The following charts G2-G6 support Fig. 3, and should be read together with the following description.

Looking at the first step in the timeline (Application Specification) in conjunction with chart G2, it can be seen that BLC Inc established a Contract APP (Application ID 001) on 91.06.03.17.00.00 (that is, 5pm on June 3, 1991) to deal with economic risk management. Application ID 001 supports a range of products, relating to different phenomena.

Looking at the second step in the timeline (Product Specification) in conjunction with chart G3, it can be seen that BLC Inc is also product sponsor of Product 10061, within APP ID 001, specified at the same time (91.06.03.17.00.00). This product relates to the market termed Stock Indices and to the sub-market termed PTSE 75. The maturity date for Product 10061 is 96.06.03.17.00.00.00. The consideration for a specific contract involving Product 10061 is in the form of money (commercial bank deposits denominated in Australian dollars). The entitlement is also in the form of commercial bank deposits denominated in Australian dollars, payable (if necessary) immediately after the product's specified maturity date/time.

Looking at the third step in the timeline (Potential Counterparty Product Pricing Specifications), two entities, Abrahamsons and Carpenters Inc, are acting as potential counterparties for forthcoming primary product orders dealing with Product 10061. At this point in the timeline (95.01.01.17.00.00.00), 43 months after the specification of Product 10061, both Abrahamsons and Carpenters Inc have currently-specified parameters for pricing potentially forthcoming orders for the product.

Looking at the fourth step in the timeline (Primary Order Specification), in conjunction with chart G4, it can be seen that an ordering party, Abbotts & Taylor, is seeking a contract, from an offering party, in Product 10061 at that time (95.01.01.17.37.06.00). Chart G4 shows the specific parameters (entitlement) that Abbotts & Taylor has defined for the contract it is seeking at this time, including a maximum acceptable contract consideration amount of 54,000 (denominated in commercial bank, Australian dollars) and elemental entitlements for each of the range of PTSE 75 outcomes at maturity. The entitlements as a function of outcome are conveniently represented graphically.

Looking at the fifth step in the timeline, Order Specification Pricing, in conjunction with chart G5, it can be seen that Abrahamsons' specified pricing parameters, are used to price the Abbotts & Taylor order at 95.01.01.17.38.02.00. Abrahamsons' pricing parameters indicate that their appropriate defined circumstances ID is 26, which implies a commission rate of 1.25% and a discount rate of 10.00% per annum. The registering data also includes a particular set of component product prices and a particular set of assessed probabilities of occurrence. The pricing achieved by the following formula $\sum_{\leq 1600}^{\geq 2200}$ (entitlement amount x component product price) = 59,580, applying the discount rate (10%) to give a present day value of 51,280, plus the commission (1.25%) to give the counter consideration of 51,920 (denominated in commercial bank, Australian dollars). Abrahamsons' parameters calculate that this will yield them a base margin on the contract of 4,580 (again denominated in commercial bank, Australian dollars).

Still looking at the fifth step in the timeline, in conjunction with chart G6, it can be seen that Carpenters Inc's specified pricing parameters, are also used to price the Abbotts & Taylor order at 95.01.01.17.38.02.00. Carpenters Inc's pricing parameters indicate that their appropriate defined circumstances ID is 17 implying a commission rate of 1.30% and a discount rate of 9.80% per annum. They too have submitted a particular set of component product prices and a particular set of assessed probabilities of occurrence for all possible outcomes of the PTSE 75 within the range 1600 - 2200. This results in a contract bid price of 53,050 (denominated in commercial bank, Australian dollars), which Carpenters Inc's parameters calculate will yield them a base margin on the contract of 5,610 (again denominated in commercial bank, Australian dollars).

The subsequent step of matching involves, principally, determining which counterparty counter considerations fall below Abbotts & Taylor's maximum specified consideration and of those, which is the lowest. There can be further considerations such as counterparty absolute loss, expected loss, expected value and maximum contract portfolio composition attributes that must be satisfied before a match is finally consummated.

The balance of the steps shown in the timeline of Fig. 3 up to settlement are not described here, although they are to be found in International Application No. PCT/AU93/00250.

At all instances up to and including contract matching, the identity of the counterparties is unknown to Abbotts & Taylor. The counterparties similarly are not active in the contract matching, and only become aware of their part in a contract after matching, but even then may not know the identity of the ordering party.

Life Cycle of Economic Management Contract: Example II

This further example of a risk management contract is an extension of Example I. More particularly, however, it is a special case of the general case of Example I, in

that for a particular phenomenon the same entitlement is specified by the ordering party for each of the possible outcomes. In the terminology of International Application No. PCT/AU93/00250, this is a case where $X = 1$, $\alpha(X)$ is not applicable, $\beta(X) =$ the specified non-contingent entitlement (constant), and $\gamma(X) = 11$, where "11" denotes a mathematical shape that is a straightline with respect to the 'outcome' axis, drawn from a menu of such shapes. Put another way, the gradient of the graph of entitlement (y - axis) against outcome (x - axis) is zero.

The counterparty registering data remains the same. It can be thought of as the scenario where the outcome is not of concern to the ordering party. When its future entitlement is positive, the contract, from the ordering party's view, is in the nature of a loan, in that the consideration is made available now for a future known entitlement. It is of course possible for the consideration and entitlement to be negative so that the nature of the contract from the ordering party's viewpoint is borrowing.

The example shows just this situation, in that one party (such as an institutional fund manager) seeks to avoid the adverse consequences of not having immediate possession of a defined resource (say, Australian dollars) by becoming a party to a contract with another, as-yet-unknown, party (such as another fund manager seeking to avoid the adverse consequences of being unable to adequately utilise the defined resource).

The specific contract offering is one which provides an ordering party with a specified non-contingent obligation (that is, a negative future entitlement) to make an Australian dollar future payout to the contract's counterparty upon that counterparty's payment of a calculated up-front consideration money amount to the ordering party.

Thus, for a given guaranteed entitlement payout amount by the ordering party to its counterparty on a contract's maturity date, the up-front consideration payment is essentially a function of two matters implicitly determined between the ordering party and the counterparty registering data:

1. The discount (interest) rate applicable to the contract (this will itself be credit risk-free Australian dollar instruments with the same maturity date, plus a margin reflecting the counterparty's assessment of the likelihood of default by the ordering party in making their required future entitlement payment in Australian dollars);

2. The counterparty's sought-after commission on the transaction.

Note that if, say, the contract entitlement is based in US dollars, the matter of the counterparty's defined forward Australian dollar/U.S. dollar exchange rate would also be relevant.

As noted, the relevant key stakeholders are the same as in Example I: an application promoter (BLC Inc); various product sponsors (the relevant one for the example being BLC Inc itself); various product ordering parties (the relevant ones for the example being Abbotts & Taylor and Shearer & Associates); various potential counterparties (the relevant ones for the example being Abrahamsons and Carpenters Inc); a counterparty guarantor (CNZ Banking Corporation); and an application regulator (the Pacific Central Bank).

A timeline depicting the steps in the contract from the first step, Application Specification, to the final step, Contract Settlement, is shown in Fig. 4 and further supported by charts H2 - H6.

Looking at the first step in the timeline, Application Specification, in conjunction with chart H2, we see that BLC Inc established a Contract APP (Application ID 001) on 91.06.03.17.00.00 (that is, 5 pm on June 3, 1991) to deal with economic risk management. The application involves a pricing and matching objective function of: "minimise pre-tax consideration payment under an expected value (EV)/certainty equivalent (CE) value". Note that a negative consideration payment is allowed.

Looking at the second step in the timeline, Product Specification, in conjunction with chart H3, we see that BLC Inc was also product sponsor of Product

10061 at the same time (91.06.03.17.00.00). This product relates again to the market of stock indices. The maturity date for Product 10061 is 96.06.03.17.00.00.00. The sub-market is the PTSE 75 stock index. The consideration for a specific contract involving Product 10061 is in the form of money (commercial bank deposits denominated in Australian dollars). The entitlement is also in the form of commercial bank deposits denominated in Australian dollars, payable immediately after the product's specified maturity date/time.

Looking at the third step in the timeline, Potential Counterparty Product Pricing Specifications, one can find two entities, Abrahamsons and Carpenters Inc, acting as potential counterparties for forthcoming primary product orders dealing with Product 10061. At this point in the timeline (95.01.01.17.00.00.00), 43 months after the specification of Product 10061, both Abrahamsons and Carpenters Inc have currently-specified parameters for pricing potentially forthcoming orders for the product.

Looking at the fourth step in the timeline, Primary Order Specification, in conjunction with chart H4, it can be seen that Abbotts & Taylor is seeking a contract in Product 10061 at that time (95.01.01.17.37.06.00). Chart H4 shows the specific parameters that Abbotts & Taylor has defined for the contract it is seeking at this time, namely $A 83,830 for any feasible product value including a minimum acceptable contract consideration amount of ($A 55,000). The parentheses indicate that the consideration is negative. The calculated counter consideration (≥ $A 55,000) will be paid by the counterparty to Abbotts & Taylor immediately after contract matching.

Looking at the fifth step in the timeline, Order Specification Pricing, in conjunction with chart H5, it can be seen that Abrahamsons (using the specified pricing parameters set at 95.01.01.17.37.06.00) prices the Abbotts & Taylor order at 95.01.01.17.38.02.00. Abrahamsons' pricing parameters, indicated by their defined circumstances ID of 31, require a commission rate of 1.25% and a discount rate of 10.00% pa. A particular set of component product prices together with a particular set

of assessed probabilities of occurrence are specified. This results in a counter consideration of ($A 58,710), which Abrahamsons' parameters calculate will yield them a base margin on the contract of $A 1,980.

Still looking at the fifth step in the timeline, in conjunction with chart H6, it can be seen that Carpenters Inc (again using the specified pricing parameters set at 95.01.01.17.37.06.00) also prices the Abbotts & Taylor order at 95.01.01.17.38.02.00. Carpenters Inc's pricing parameters, indicated by their defined circumstances ID of 19, require a commission rate of 1.30% and a discount rate of 9.8% pa. A particular set of component product prices and a particular set of assessed probabilities of occurrence are specified. This results in a contract bid price of ($A 58,640), which Carpenters Inc's parameters calculate will yield them a base margin on the contract of $1,990.

Looking at the sixth step in the timeline, Primary Order Matching, it can be found that Abrahamsons' price bid of ($A 58,710) is above Carpenters Inc's bid of ($A 58,640) and above Abbotts & Taylor's specified minimum consideration price of ($A 55,000). This leads to a formal matching of Abbotts & Taylor's order by Abrahamsons at 95.01.01.17.38.07.00. Before the matching formally occurs, a check is made that absolute loss, expected loss, expected value and portfolio attribute limits are not violated.

The seventh step in the timeline, Contact Maturity, refers to the actual determination of the product value at time of maturity, 96.06.03.17.00.00.00.

The eighth step in the timeline involves the formal payment of $A 83,830 by Abbotts & Taylor to Abrahamsons.

The example just described can also be thought of as a case where the market is irrelevant, and therefore there is no minimum or maximum product definition value nor product step value. This equates to there being no future outcome, rather simply a known specified entitlement that is not dependent upon the outcome of any particular phenomenon. The mathematical representation of curves or lines no longer is relevant.

The counterparty counter consideration thus becomes a function only of the discount rate, commission and (if applicable) entitlement exchange rate.

Life Cycle of Economic Management Contract: Example III

This embodiment relates to an economic management contract (based on a variation of Example II) and describes the formulation of an immediate exchange contract involving an entitlement of a defined $US amount in return for a to-be-determined consideration denominated in commercial bank Australian dollars.

This example is a special case of the general case of Example II in that it is independent of the outcome of any particular phenomenon. It has only a single outcome for which a single entitlement is specified by the ordering party.

Unlike Example II, however, this case also involves a unique notion of a contract maturity date/time. This is the notion of "as soon as possible after the date/time the transaction is originated by the ordering party", implying an immediate exchange. That is, the date of maturity is now.

In this example, the offering is one which provides a contract ordering party with a specified non-contingent entitlement to receive its desired $US currency amount ($US 70,000) as soon as possible after the ordering party specifies it is prepared to immediately pay not more than $A 102,900 (as a consideration) in exchange for this US currency.

In this example, the relevant key stakeholders are: an application promoter (BLC Inc); various product sponsors (the relevant one for the example being BLC Inc itself), various product ordering parties (the relevant ones for the example being Abbotts & Taylor), various potential counterparties (the relevant ones for the example being Abrahamsons and Carpenters Inc), a counterparty guarantor (CNZ Banking Corporation) and an application regulator (the Pacific Central Bank).

The timeline depicting the steps in the contract from the first step, Application Specification, to the final step, Contract Settlement, is shown in Fig. 5, and are supported by charts J2 - J6.

Looking at the first step in the timeline, Application Specification, in conjunction with chart J2, we see that BLC Inc established a contract APP (Application ID 201) on 91.06.03.17.00.00 (that is, 5pm on June 3, 1991) to deal with economic risk management. The application involves a pricing and matching objective function of: "maximise pre-tax consideration/entitlement exchange rate". Application ID 201 supports a range of products.

Looking at the second step in the timeline, Product Specification, in conjunction with chart J3, we see that BLC Inc was also product sponsor of Product 11099 at the same time (91.06.03.17.00.00). This product relates to the market of immediate exchange. The maturity date for Product 11099 is "as soon as possible after transaction initiation". The consideration for a specific contract involving Product 11099 is commercial bank deposits denominated in Australian dollars. The entitlement is in the form of commercial bank deposits denominated in US dollars, payable immediately after the product's specified maturity date/time (that is, as soon as possible after transaction initiation).

Looking at the third step in the timeline, Potential Counterparty Product Pricing Specifications, two entities, Abrahamsons and Carpenters Inc, are potential counterparties for forthcoming primary product orders dealing with Product 11099. At this point in the timeline (92.01.01.17.00.00.00), 6 months after the specification of Product 11099, both Abrahamsons and Carpenters Inc have currently-specified parameters for pricing potentially forthcoming orders for the product.

Looking at the fourth step in the timeline, Primary Order Specification, in conjunction with chart J4, it can be seen that an ordering party, Abbotts & Taylor, is seeking a contract from an offering party in Product 11099 at that time (92.06.03.17.00.00.00). Chart J4 shows the specific parameters that Abbotts & Taylor

has defined for the contract it is seeking at this time, including a maximum exchange (consideration) amount of ($A 102,900) and a defined $US 70,000 entitlement.

Looking at the fifth step in the timeline, Order Specification Pricing, in conjunction with chart J5, it can be seen that the system determines that the counter consideration amount Abrahamsons judge to be ideal given their specified parameters is $A 94,500. This occurs at 92.06.03.17.38.02.00. Abrahamsons' pricing parameters specify an exchange rate of 0.75, a commission rate of 2.00% and a single assessed probability of occurrence of one (1) (discount rate and component product prices being irrelevant in this example). The counter consideration of $A 94,500 is lower than Abbotts & Taylor's specified maximum consideration amount of $A 102,900.

Still looking at the fifth step in the timeline, in conjunction with chart J6, the system determines that the counter consideration amount Carpenters Inc judge to be ideal given their specified parameters is $A 101,300. Carpenters Inc's pricing parameters imply an exchange rate of 0.70, a commission rate of 1.30% and a single assessed probability of occurrence of one (1) (discount rate and component product prices again being irrelevant).

Looking at the sixth step in the timeline, Order Matching, it can be found that the system assesses Abrahamsons' to be superior to that of Carpenter Inc and below Abbotts & Taylor's maximum consideration. This leads to a formal matching of Abbotts & Taylor's order by Abrahamsons' at 92.06.03.17.38.12.00. Matching coincides in time with maturity, and very shortly thereafter there is the transfer of $A 94,500 from Abbotts & Taylor to Abrahamsons and a corresponding transfer of $US 70,000 from Abrahamsons to Abbotts & Taylor. This then represent finalisation of the transaction, including all the transfers involved at the date/time of maturity of other contract types.

A further embodiment, relevant to each of the embodiments of Examples I to III above, involves the order pricing procedure as before, followed by a step of obligating the ordering party with the would-be matched counterparty for a period of

time before the match is formally made. As before, the consideration can be payable immediately upon match or deferred for a time (even up until maturity), and the date of maturity can be at a future time from matching (or even immediately upon match). The period of obligation can be specified by the promoter stakeholder, and thus be known to the ordering party and the registering counterparties. The period of obligation thus enables parties to contract to future contingent contracts (in the case of Examples I and II) or future exchange (in the case of Example III).

Decision Support

The system block diagram shown in Fig. 6 differs from that shown in Fig. 1 in that product ordering parties 13 and potential product counterparties 14 are collectively known as participating parties 19. As discussed previously, the one entity can act as an ordering party, as a counterparty or as both an ordering party and counterparty. For the purpose of the immediately following discussion, it is assumed that all participating parties 19 can act both as an ordering party and a counterparty.

Fig. 7 shows a flow of information or a single ordering party/counterparty 19. That entity 19 receives information concerning settled (matured) contracts and information concerning the trading environment. Both these types of information are provided by the core system facilities 20.

The "contracts" referred to are meant in the same sense as for previously noted International Application No. PCT/AU93/00250 and as discussed above. The contract pricing and matching methodology underpins all of the information flow and decision making. The subject matter to be described relates to providing participating parties with a decision support facility to assist in order formulation, contract trading and the like, based more generally on perceived attitudes and objectives.

While order placement and matching occur within the core system 20 in the same manner as previously described, and hence ordering data and registering data are input to allow pricing and matching, the participating parties optionally can specify only

broader inputs, that are translated into the necessary specific detail to be submitted to the core system by the decision support facility resident in the individual user facilities 70.

A participating party 19 supplies contract-based inputs via the filter 30 to its processing facility 70, as well as forecast data, objectives and perceived phenomena 'exposure' data. In the absence of any contract-based inputs from the participating party 19, the processing facility 70 processes the higher level information represented by the forecast, objectives and perceived phenomena 'exposure' to derive transaction instructions that are forwarded via the telecommunications gateway 25 to the core system processing 20. The user processing facility 70 also receives information from the core system facility 20 concerning the confirmation of transactions, contract status changes and contract revaluations. Thus the participating party can be 'prompted' as to appropriate courses of action based upon that party's 'attitude' to risk as defined by the contract inputs, forecasts, objective and perceived exposure. In this way, the participating party 19 is able to manage its risk exposure at a higher level than on a per-contract basis.

The diagram of Fig. 8 is similar to that of Fig. 7, except that the user processing facility 70 makes no decisions on a per-contract basis, rather supplies information to the core system facility 20 based only on individual participating party's forecasts, objectives and perceived phenomena 'exposure'. The per-contract level transaction handling is handled by the core system 20.

The particular system configuration is not important for the purposes of the following example, rather the description deals with the flow only of information, and in this regard the types of information shown in Figs. 7 and 8 are referred to.

In a basic form, the Forecasts are constructed on the basis of the probabilities of occurrence of the predetermined phenomena. In more sophisticated versions, the forecasting further can be based on one or more of the following assessments:

(a) correlations between assessed probabilities of occurrence,

(b) contract re-sale and offer values prior to individual contract maturity,

(c) contract payout discount rate determinant,

(d) currency and money-type assist future exchange rates for contract portfolio valuation, and

(e) objectives and strategies of other participating parties.

In the basic form, the Objectives incorporate particular desired contracts, particular desired products (contracts involving the same future phenomenon) together with portfolio and consideration payments-resource minimum and maximum values. Further, the objectives can be limited by the desired importance "weightings" on the individual objectives and particular desired contract entitlement discount rates. In a more sophisticated version, the objectives can include: benefits and costs of alternative possible incremental portfolio gain and loss possibilities, and portfolio expected value and standard deviation indifference points. The trading environment information provided by the system facilities is "broadly indicative" in character, however is available to the relevant participating parties on a real-time basis. Again, in a more sophisticated version, the information can be highly specific in its relevance.

The functionality of the data filter in a basic version is minimal, implying that trading environment information provided by the core system facilities is driven solely by the notion of what the core system is capable of telling participating parties on a confidential basis, as distinct from the notion of what participating parties would like to know to make decisions relevant to them. In a more sophisticated version, the filtering can be significant and thereby driven by what the order party/counter party wishes to know. For example, the filter can make live determinations by a static expert system or by a dynamic expert/artificial intelligence system.

Further, for the basis of the present description, the following assumptions are made concerning transactions that can be effected by a participating party. No participating party has the ability to effect transactions involving:

(a) purchasing or writing an option to be a party to a new (primary) contract;

(b) exercising an option to be a party to a new (primary) contract;

(c) purchasing or writing or option to buy/sell (the positive of zero entitlement portion of) an existing (secondary) contract;

(d) exercising an option to buy/sell (the positive or zero entitlement of) an existing (secondary) contract; and

(e) submitting transactions pricing-enquiry orders.

These constraints mean that participating parties thus can only effect the following types of transactions:

(i) participating parties that have ordering party status only (type A) can:

(a) initiate new (primary) orders (involving positive or zero entitlements only;

(b) sell its existing contracts;

(c) purchase the (positive or zero entitlement portion) of contracts offered for sale by others; and

(d) withdraw submitted but as yet unexecuted transactions of the three-above noted types.

(ii) participating parties that have both ordering party and counter party status (termed type B) can:

(a) continually submit order pricing and limit conditions to the system;

(b) initiate (primary) orders (involving positive, zero and negative entitlements);

(c) sell (the positive or zero entitlement portion of) their existing contracts;

(d) purchase the (positive or zero entitlement portion) of contracts offered for sale by others; and

(e) withdraw submitted but as yet unexecuted transactions of the four above-noted types.

At any point in time, individual participating parties have direct access to trading environment information so as to have a facility to self-define and be system-appraised of various data items. Specifically, participating parties can have access to core system market conditions, comprising settled contract information, contract valuation prices (applicable to all participating parties) and indicators of aggregate transaction volumes and like information. They also can have access to the processing status (and valuation) of transactions they have previously input to the system comprising their own (valued) existing contracts (with a current "mark-to-market" valuation, including "offered for sale" contracts and all other contracts, and further contracts offered for sale by others, their own current order pricing and limit conditions (type B parties only), their own unmatched and/or unconfirmed new (primary) orders and their own unexecuted previously submitted instructions to bid for the (positive or zero) entitlement portion of confirmed contracts offered for sale by others.

Participating parties also have the facility to self-define both their perceived "real business" exposure to assessed relevant future phenomenon and the composition of their current phenomena forecasts and own-objectives which, in conjunction with current information on the status of transactions previously input to the system and core system-supplied market conditions, underlie the new transaction inputs currently recommended by their facilities. This latter composition includes the party's current phenomena forecasts comprising assessed probabilities of selected future phenomena and their own objectives, including desired contract, product, portfolio and consideration payment resource minimum and maximum values and their desired contract entitlement discount rates.

Furthermore, the participating parties are appraised of new transactions recommended for input to the core system facilities and these comprise:

(i) changes to existing order pricing and limit conditions maintained by the system (type B parties only):

(a) order pricing parameters comprising desired future phenomena pricing probabilities, commission rates and entitlement discount rates for individually specified new order transaction types, and

(b) limit conditions comprising contract, product and portfolio minimum and maximum expected and absolute values (and other conditions with respect to minimum acceptable ordering party characteristics and desired consideration/entitlement payment arrangements).

(ii) desired new (primary) orders, comprising:

(a) an identifier of the applicable future phenomenon,

(b) sought after entitlement payouts/receipts contingent on the possible values of the future phenomena,

(c) a specified minimum acceptance consideration payment amount,

(d) specified minimum acceptable counterparty characteristics (for example credit rating, location, etc.), and

(e) desired consideration/entitlement payment arrangements.

(iii) new instructions to sell (the positive or zero) entitlement portion of specified own existing contracts, these comprising:

(a) an identifier of the applicable contract,

(b) a specified minimum disposal price,

(c) specified minimum acceptable acquiring party characteristics, and

(d) desired payment arrangements.

(iv) new instructions to bid for the (positive or zero) entitlement portion of existing contracts offered for sale by others, these comprising:

(a) an identifier of the applicable contract,

(b) a specified maximum acquisition price, and

(c) desired payment arrangements.

(v) instructions to withdraw submitted but as yet unexecuted transactions of the four above-noted types; these instructions essentially only comprise an identifier of the transaction concerned.

Further to the consideration of participating parties being appraised, participating parties may explicitly or implicitly "authorise" submission of recommended new transactions to the core system. Thus, following one-time changes in the data items, the system adjusts to a stable-state involving no further new transaction recommendations/initiations until additional data changes are made by the participating party concerned or result from the changed status of existing core system transactions.

The mechanism by which the facilities of a participating party continually determine the new transactions requiring input to the core system is an "objective function optimization" mechanism, typically formulated mathematically as a linear or non-linear programming problem. The operation of this mechanism is automatically triggered by any/all input data changes recorded by the facility.

Furthermore, in at least this embodiment, the mechanism is likely to be based on goal programming, a particular type of linear programming model. This optimization approach seeks to minimize the sum of the weighted difference between the participating party's specified desired contract, product and portfolio outcomes and the calculated current value of these measures, subject to nominated performance and logical constraints not being violated. The variables in the model are, essentially, the five new transaction types set out above. Thus the model continually seeks to determine whether and in what form to submit new transactions to the core system to bring the current values of the participating party's selected performance measures as close as possible to their desired values.

Assuming all three participating parties use the above-described optimization mechanism, operation of the system can be thought of as occurring in cycles, the

commencement of each cycle being marked by, say, the receipt by participating parties of core system market conditions applying at the completion of the prior cycle and the processing status of their previously submitted transactions to the core system. In practice, the cycles applying to individual participating parties may not be aligned; however, for ease of explanation here, this is assumed to be so.

The cycle applicable to any participating party is shown in Fig. 9, and assumed that all participating parties are solely concerned about a single, common future phenomenon (single product). The variables expressed in Fig. 9 are as follows:

b = Participating Party ID (1,2,3 etc.),

t = Applicable cycle,

CSSMS =Core system supplied market conditions (at end of cycle t-1),

PSOPST = Processing status of previously submitted transactions,

PRBE = Perceived real-business exposure,

OO = Own objectives,

NTR = New transaction recommendations,

NTD = New transaction despatches.

This cycle repeats as the system is operating.

Reference now is made to Example I. In accordance with that embodiment, the ordering party, Abbotts & Taylor, and the applicable product counterparty, Abrahamsons, can view the same transaction at a higher level that is exemplified as follows:

<u>Abbotts & Taylor's perspective (attitude)</u>

Abbotts & Taylor's involvement in the transaction occurs at the fourth step in the timeline. This is the point at which Abbotts & Taylor prepares a Primary Order Specification (see chart G4). Chart G4 shows the parameters that Abbotts & Taylor has defined for the contract, including a maximum acceptable contract consideration amount of 54,000 (commercial bank Australian dollar deposits). At the fifth step in the timeline, Abbotts & Taylor despatches the order for counterparty pricing.

These fourth and fifth steps in the timeline respectively correspond to the above-described variables, NTR and NTD (standing for "new transaction recommendations" and "new transaction despatches"). Assuming here that NTR is equivalent to NTD, the obvious questions begged by this transaction are:

1. Is this Abbotts & Taylor's only transaction at this time and, if so, why?; and
2. With respect to the transaction:
   - Why is the entitlement shaped the way it is (see chart G4)? and
   - Why was 54,000 (AUD commercial bank deposits) the amount selected by Abbotts & Taylor as their maximum consideration?

Amongst others, these are questions addressed directly by the above-described optimization mechanism. In the language introduced in Fig. 9 as discussed above, had Abbotts & Taylor been making use of this mechanism, the transaction processing cycle involving the fourth and fifth steps in the timeline would have commenced with Abbotts & Taylor receiving their "CSSMS" and "PSOPST". In turn, this information may or may not have caused them to modify their existing "PRBE", "PF", and "OO" parameters. This ultimately yielded the single new transaction referred to above. In this situation, the optimization process would have determined for Abbotts & Taylor that:

1. They could not be brought any closer to their stated objectives by, say:
   - Withdrawing an existing unmatched transaction previously submitted to the system; and/or
   - Submitting any other new transactions;
2. Any other shaped entitlement would not yield them as great a contribution to their objective function as would their specified entitlement;

3. Any higher maximum consideration, if ultimately required as a transaction payment, would worsen their perceived "objective" position; and
4. Any lower maximum consideration would be likely to cause the transaction to remain unmatched, thereby again worsening their "objective" position.

Thus, based on all information currently available to them, submission of this single new transaction is the best action Abbotts & Taylor can take at this time.

Abrahamsons' perspective (attitude)

In the above-described example, Abrahamsons' involvement in the transaction occurs at the third step in the timeline. This is the point at which Abrahamsons prepares a potential counterparty product pricing specification and submits this to the core system. Chart G5 shows the parameters that Abrahamsons has defined for application against incoming new product orders. Chart G5 also shows how Abbotts & Taylor's order entitlement is prepared for Abrahamsons' pricing calculations once its "Defined Circumstances ID" has been ascertained. These parameters include:

1. Commission rate;
2. Discount rate;
3. Component product prices;
4. Assessed probabilities of occurrence; and
5. Various contract, product and portfolio minimum and maximum limits

(shown only in chart G7 to be found in International Application No. PCT/AU93/00250).

Thus, for Abrahamsons, the third step in the timeline corresponds to the above-described variables, NTR and NTD (standing for "new transaction recommendations" and "new transaction despatches"). Again assuming here that NTR is equivalent to NTD, the obvious questions begged by this set of parameter specifications is:

1. Why a commission rate of 1.25%?
2. Why a discount rate of 10%?
3. Why this particular set of component product prices (adding to 1.0402)?
4. Why this particular set of assessed probabilities of occurrence? and
5. Why this particular set of contract, product and portfolio minimum and maximum limits?

Amongst others, these are questions addressed directly by the above-described optimization mechanism. In the language introduced in Fig. 9 as discussed above, had Abrahamsons been making use of this mechanism, the transaction processing cycle involving the third step in the timeline would have commenced with Abrahamsons receiving their "CSSMS" and "PSOPST". In turn, this information may or may not have caused them to modify their existing "PRBE", "PF", and "OO" parameters. This ultimately yielded the single new parameter-specifying transaction referred to above. In this situation, the optimization process would have determined for Abrahamsons that they could not be brought any closer to their stated objectives by, say:

(i) Withdrawing an existing unmatched transaction previously submitted to the system; and/or

(ii) Submitting any other new transactions; and/or

(iii) Increasing or decreasing their sought-after commission rate, discount rate etc (this would only reduce their aggregate returns from being a counterparty); and/or

(iv) Easing or tightening their contract, product and portfolio limits (this would either remove otherwise worthwhile "match" opportunities or increase the riskiness of their overall position).

Thus, again, based on all information currently available to them, submission of this single new parameter-specifying transaction is the best action Abrahamsons can take at this time.

CHART G2

APPLICATION SPECIFICATION	**AS AT 91.06.03.17.00.00.00**
APPLICATION ID:	**001**
APPLICATION PROMOTER:	**BLC INC**
PRIMARY APPLICATION USE:	ECONOMIC RISK MANAGEMENT
FEASIBLE COUNTERPARTY NUMBERS:	MULTIPLE COUNTERPARTIES
PRIVATE/PUBLIC USE:	PUBLIC USE
ACCEPTABLE COMMS MEDIUMS:	COMPUTER - COMPUTER LINK
RETAIL/WHOLESALE USE:	WHOLESALE USE
PRICING AND MATCHING PROCESS:	MINIMISE PRE-TAX CONSIDERATION PAYMENT UNDER AN EV/CE REGIME
CONTRACT REVALUATION FREQUENCY:	DAILY
ORDERING PARTIES ALLOWED NEGATIVE CONTRACT PAYOFFS ?	YES
APPLICATION ACCESS LIMITATIONS:	NONE

CHART G3

PRODUCT SPECIFICATION

PRODUCT SPECIFICATION	**AS AT 91.06.03.17.00.00.00**
PRODUCT ID:	**10061**
PRODUCT SUMMARY:	
APPLICATION ID:	001
APPLICATION PROMOTER:	BLC INC
PRODUCT SPECIFICATIONS:	
MARKET:	STOCK INDICES
SUB-MARKET:	PTSE 75
MARKET TYPE:	SPOT
ESTABLISHMENT DATE/TIME:	91.06.03.17.00.00.00
MATURITY DATE/TIME:	96.06.03.17.00.00.00
CONSIDERATION/ENTITLEMENT DENOMINATION TYPE:	MONEY
CURRENCY TYPE (IF APPLICABLE):	COMMERCIAL BANK DEPOSIT
NATIONAL CURRENCY TYPE (IF APPLICABLE):	AUD
MINIMUM PRODUCT DEFINITION VALUE:	1600
MAXIMUM PRODUCT DEFINITION VALUE:	2200
PRODUCT STEP VALUE:	10

CHART G4

PRIMARY ORDER SPECIFICATION **AS AT 95.01.01.17.37.06.00**

ORDERING PARTY: **ABBOTTS & TAYLOR**
ORDERING PARTY REFERENCE: PQZ 260

PRODUCT:
PRODUCT ID: 10061
MARKET: STOCK INDICES SUB-MARKET: PTSE 75 MARKET TYPE: SPOT
ESTABLISHMENT DATE/TIME: 91.06.03.17.00.00.00 MATURITY DATE/TIME: 96.06.03.17.00.00.00

ENTITLEMENT:
DENOMINATION TYPE: MONEY
CURRENCY TYPE (IF APPLICABLE): COMMERCIAL BANK DEPOSIT
NATIONAL CURRENCY TYPE (IF APPLICABLE): AUD
MAXIMUM ENTITLEMENT AMOUNTS: See Graph below

CONSIDERATION:
DENOMINATION TYPE: MONEY
CURRENCY TYPE (IF APPLICABLE): COMMERCIAL BANK DEPOSIT
NATIONAL CURRENCY TYPE (IF APPLICABLE): AUD
MAXIMUM CONSIDERATION AMOUNT: 54,000

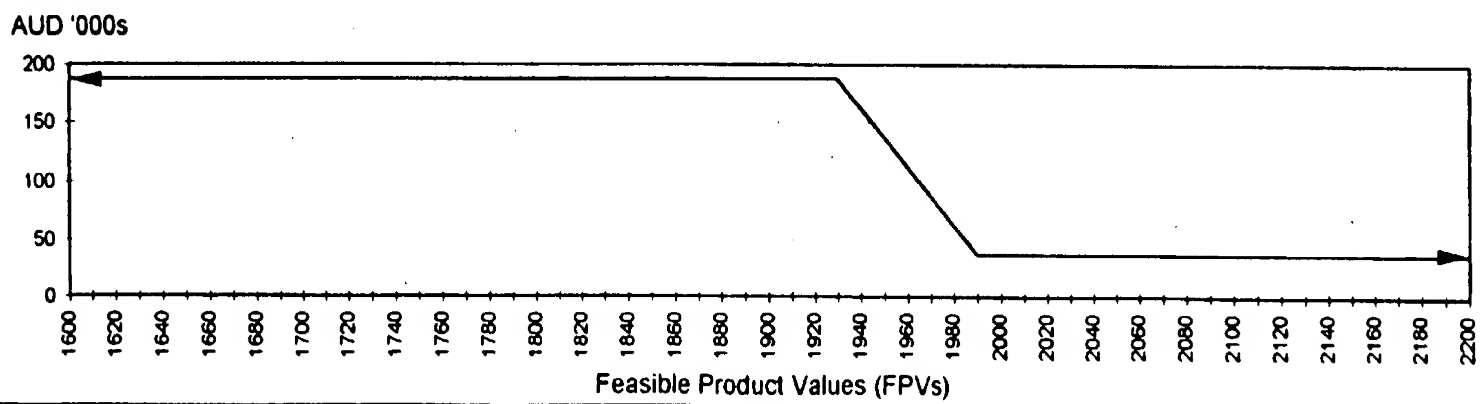


CHART G5

APPLICATION ID: 001

ORDER SPECIFICATION PRICING

AS AT 95.01.01.17.38.02.00

PRODUCT ID: 10061

ORDER SPECIFICATION PRICING PARTY: **ABRAHAMSONS** [Potential Counterparty No 1]

DEFINED CIRCUMSTANCES ID: 26

COMMISSION RATE: 1.25%
DISCOUNT RATE: 10.00% pa
COMPONENT PRODUCT PRICES: see Column 3 below

Feasible Product Definition Values	Net Contingent Entitlement Amounts	Component Product Prices [ID 26]	Implied Contingent Entitlement Amounts	Assessed Probabilities of Occurrence	Net Contingent Entitlement (Valuation) Amounts	Net Contingent Negative Entitlement (Valuation) Amounts	Maximum Absolute Negative Entitlement Amount
<	0.00						
1600	(187.200)	0.000220	(0.041)	0.000020	(0.004)	(0.004)	(187.200)
1610	(187.200)	0.000227	(0.042)	0.000027	(0.005)	(0.005)	
1620	(187.200)	0.000237	(0.044)	0.000037	(0.007)	(0.007)	
1630	(187.200)	0.000249	(0.047)	0.000049	(0.009)	(0.009)	
1640	(187.200)	0.000266	(0.050)	0.000066	(0.012)	(0.012)	
1650	(187.200)	0.000287	(0.054)	0.000087	(0.016)	(0.016)	
1660	(187.200)	0.000314	(0 059)	0.000114	(0.021)	(0.021)	
: : : :	: : : : : :	: : : : : :	: : : : : :	: : : : : :	: : : : : :	: : : : : :	
2130	(37.440)	0.029642	(1.110)	0.029442	(1.102)	(1.102)	
2140	(37.440)	0.028625	(1 072)	0.028425	(1.064)	(1.064)	
2150	(37.440)	0.027469	(1.028)	0.027269	(1.021)	(1.021)	
2160	(37.440)	0.026193	(0.981)	0.025993	(0.973)	(0.973)	
2170	(37.440)	0.024819	(0.929)	0.024619	(0.922)	(0.922)	
2180	(37 440)	0.023369	(0 875)	0.023169	(0 867)	(0.867)	
2190	(37.440)	0 021865	(0.819)	0.021665	(0.811)	(0.811)	
2200	(37.440)	0.020330	(0.761)	0.020130	(0 754)	(0.754)	
>	0.000	0.146635	0.000	0.158835	0.000	0.000	
		1.0402	**(59.580)**	**1.0000**	**(55.000)**	**(55.000)**	**(187.200)**

Base Contract Bid Price (in Product Denomination terms)	59 580	
Net Present Value (at 10.00% pa):	51.280	47.340
+ Flat Commission (1.25%):	0 640	
= Contract Bid Price (in Product Denomination Terms):	51.920	
Implied Base Margin on Contract:		4.580

CHART G6

APPLICATION ID: 001

ORDER SPECIFICATION PRICING

AS AT 95.01.01.17.38.02.00

PRODUCT ID: 10061

ORDER SPECIFICATION PRICING PARTY: **CARPENTERS** [Potential Counterparty No 2]

DEFINED CIRCUMSTANCES ID: 17

COMMISSION RATE: 1.30%
DISCOUNT RATE: 9.8% pa
COMPONENT PRODUCT PRICES: see Column 3 below

Feasible Product Definition Values	Net Contingent Entitlement Amounts	Component Product Prices [ID 17]	Implied Contingent Entitlement Amounts	Assessed Probabilities of Occurrence	Net Contingent Entitlement (Valuation) Amounts	Net Contingent Negative Entitlement (Valuation) Amounts	Maximum Absolute Negative Entitlement Amount
<	0.00						
1600	(187.200)	0.000220	(0.041)	0.000020	(0.004)	(0.004)	(187.200)
1610	(187.200)	0.000226	(0.042)	0.000027	(0.005)	(0.005)	
1620	(187.200)	0.000237	(0.044)	0.000037	(0.007)	(0.007)	
1630	(187.200)	0 000249	(0.047)	0.000049	(0.009)	(0.009)	
1640	(187.200)	0.000265	(0 050)	0.000066	(0.012)	(0.012)	
1650	(187.200)	0.000287	(0.054)	0.000087	(0.016)	(0.016)	
1660	(187.200)	0.000314	(0.059)	0.000114	(0.021)	(0.021)	
....	....	......	......	......	......	......	
2130	(37.440)	0.029641	(1.110)	0.029442	(1.102)	(1.102)	
2140	(37.440)	0.028625	(1.072)	0.028425	(1.064)	(1.064)	
2150	(37.440)	0.027469	(1.028)	0.027269	(1.021)	(1.021)	
2160	(37.440)	0.026192	(0.981)	0.025993	(0.973)	(0.973)	
2170	(37.440)	0.024819	(0.929)	0.024619	(0 922)	(0.922)	
2180	(37.440)	0.023369	(0.875)	0.023169	(0.867)	(0.867)	
2190	(37.440)	0 021864	(0.819)	0.021665	(0 811)	(0 811)	
2200	(37.440)	0 020330	(0.761)	0.020130	(0 754)	(0.754)	
>	0.000	0 146635	0.000	0.158835	0.000	0.000	
		1.0300	**(60.840)**	**1.0000**	**(55.120)**	**(55.120)**	**(187.200)**

Base Contract Bid Price (in Product Denomination terms):	60.840	
Net Present Value (at 9.8% pa):	52.370	47 440
+ Flat Commission (1.30%):	0.680	
= Contract Bid Price (in Product Denomination Terms):	53.050	
Implied Base Margin on Contract:		5.610

CHART H2

APPLICATION SPECIFICATION	**AS AT 91.06.03.17.00.00.00**
APPLICATION ID:	**001**
APPLICATION PROMOTER:	**BLC INC**
PRIMARY APPLICATION USE:	ECONOMIC RISK MANAGEMENT
FEASIBLE COUNTERPARTY NUMBERS:	MULTIPLE COUNTERPARTIES
PRIVATE/PUBLIC USE:	PUBLIC USE
ACCEPTABLE COMMS MEDIUMS:	COMPUTER - COMPUTER LINK
RETAIL/WHOLESALE USE:	WHOLESALE USE
PRICING AND MATCHING PROCESS:	MINIMISE PRE-TAX CONSIDERATION PAYMENT UNDER AN EV/CE REGIME
CONTRACT REVALUATION FREQUENCY:	DAILY
ORDERING PARTIES ALLOWED NEGATIVE CONTRACT PAYOFFS ?	YES
APPLICATION ACCESS LIMITATIONS:	NONE

CHART H3

PRODUCT SPECIFICATION	**AS AT 91.06.03.17.00.00.00**
PRODUCT ID:	**10061**
PRODUCT SUMMARY:	
APPLICATION ID:	001
APPLICATION PROMOTER:	BLC INC
PRODUCT SPECIFICATIONS:	
MARKET:	STOCK INDICES
SUB-MARKET:	PTSE 75
MARKET TYPE:	SPOT
ESTABLISHMENT DATE/TIME:	91.06.03.17.00.00.00
MATURITY DATE/TIME:	96.06.03.17.00.00.00
CONSIDERATION/ENTITLEMENT DENOMINATION TYPE:	MONEY
CURRENCY TYPE (IF APPLICABLE):	COMMERCIAL BANK DEPOSIT
NATIONAL CURRENCY TYPE (IF APPLICABLE):	AUD
MINIMUM PRODUCT DEFINITION VALUE:	1600
MAXIMUM PRODUCT DEFINITION VALUE:	2200
PRODUCT STEP VALUE:	10

CHART H4

PRIMARY ORDER SPECIFICATION

AS AT 95.01.01.17.37.06.00

ORDERING PARTY: **ABBOTTS & TAYLOR**
ORDERING PARTY REFERENCE: PQZ 260

PRODUCT:
PRODUCT ID: 10061
MARKET: STOCK INDICES SUB-MARKET: PTSE 75 MARKET TYPE: SPOT
ESTABLISHMENT DATE/TIME: 91.06.03.17.00.00.00 MATURITY DATE/TIME: 96.06.03.17.00.00.00

ENTITLEMENT:
DENOMINATION TYPE: MONEY
CURRENCY TYPE (IF APPLICABLE): COMMERCIAL BANK DEPOSIT
NATIONAL CURRENCY TYPE (IF APPLICABLE): AUD
SPECIFIED ENTITLEMENT AMOUNT: See Graph below

CONSIDERATION:
DENOMINATION TYPE: MONEY
CURRENCY TYPE (IF APPLICABLE): COMMERCIAL BANK DEPOSIT
NATIONAL CURRENCY TYPE (IF APPLICABLE): AUD
MINIMUM CONSIDERATION AMOUNT: (55,000)

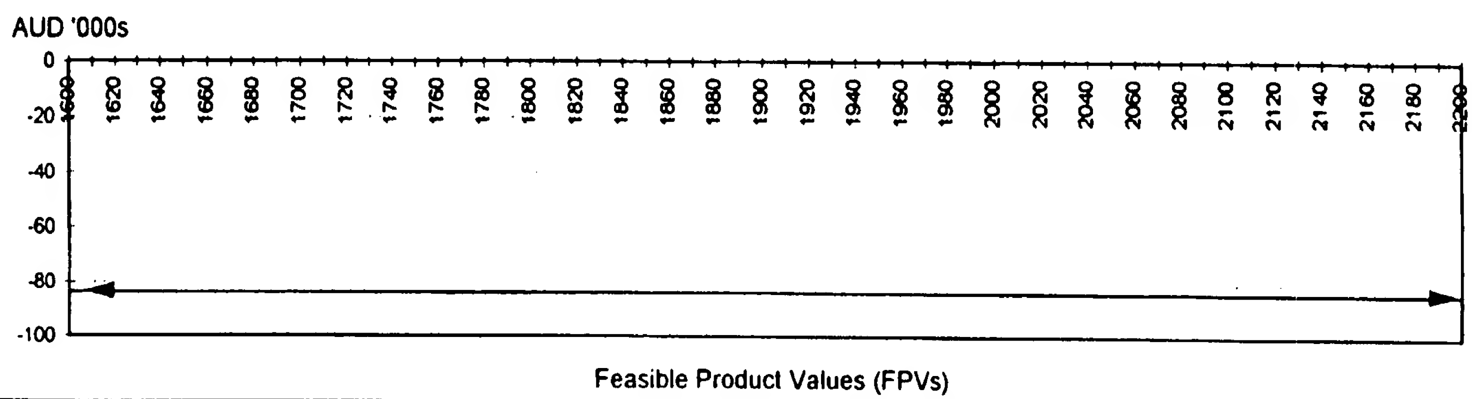


CHART H5

APPLICATION ID: 001

ORDER SPECIFICATION PRICING

AS AT 95.01.01.17.38.02.00

PRODUCT ID: 10061

ORDER SPECIFICATION PRICING PARTY: **ABRAHAMSONS** [Potential Counterparty No 1]

DEFINED CIRCUMSTANCES ID: 31

COMMISSION RATE: 1.25%
DISCOUNT RATE: 10.00% pa
COMPONENT PRODUCT PRICES: see Column 3 below

Feasible Product Definition Values	Net Contingent Entitlement Amounts	Component Product Prices [ID 31]	Implied Contingent Entitlement Amounts	Assessed Probabilities of Occurrence	Net Contingent Entitlement (Valuation) Amounts	Net Contingent Negative Entitlement (Valuation) Amounts	Maximum Absolute Negative Entitlement Amount
<	0.00						
1600	83.83	0.000213	0.017	0.000020	0.002		
1610	83.83	0.000211	0.018	0.000027	0.002		
1620	83.83	0.000226	0.019	0.000037	0.003		
1630	83.83	0.000228	0.019	0.000049	0.004		
1640	83.83	0.000241	0.020	0.000066	0.006		
1650	83.83	0.000281	0.024	0.000087	0.007		
1660	83.83	0.000312	0.026	0.000114	0.010		
: : : :	: : : :	: : : :	: : : :	: : : : :	: : : : : :		
2130	83.83	0.028127	2.358	0.029442	2.468		
2140	83.83	0.028326	2.375	0.028425	2.383		
2150	83.83	0.027320	2 290	0.027269	2.286		
2160	83.83	0.026000	2.180	0.025993	2.179		
2170	83.83	0.024818	2.080	0.024619	2.064		
2180	83.83	0.023127	1 939	0.023169	1.942		
2190	83.83	0.021436	1 797	0.021665	1 816		
2200	83.83	0.020110	1 686	0.020130	1 687		
>	0 000	0 146620	0 000	0.158835	0.000		
		0.970600	**69.07**	**1.0000**	**70.51**		
Base Contract Bid Price (in Product Denomination terms):			(69 07)		(70 51)		
Net Present Value (at 10.00% pa):			(59 45)		(60 69)		
+ Flat Commission (1.25%):			0 74				
= Contract Bid Price (in Product Denomination Terms):			(58.71)				
Implied Base Margin on Contract:					1.98		

CHART H6

ORDER SPECIFICATION PRICING

AS AT 95.01.01.17.38.02.00

APPLICATION ID: 001
PRODUCT ID: 10061

ORDER SPECIFICATION PRICING PARTY: CARPENTERS [Potential Counterparty No 2]

DEFINED CIRCUMSTANCES ID: 19

COMMISSION RATE: 1.30%
DISCOUNT RATE: 9.8% pa
COMPONENT PRODUCT PRICES: see Column 3 below

Feasible Product Definition Values	Net Contingent Entitlement Amounts	Component Product Prices [ID 19]	Implied Contingent Entitlement Amounts	Assessed Probabilities of Occurrence	Net Contingent Entitlement (Valuation) Amounts	Net Contingent Negative Entitlement (Valuation) Amounts	Maximum Absolute Negative Entitlement Amount
<	0.00						
1600	83.83	0.000211	0.017	0.000018	0.002		
1610	83.83	0.000200	0.017	0.000027	0.002		
1620	83.83	0.000225	0.019	0.000037	0.003		
1630	83.83	0.000227	0.019	0.000049	0.004		
1640	83.83	0.000239	0.020	0.000066	0.006		
1650	83.83	0.000279	0.023	0.000087	0.007		
1660	83.83	0.000310	0.026	0.000114	0.010		
::::	::::	::::	::::	:::::	:::		
2130	83.83	0.028120	2 357	0.029442	2.468		
2140	83.83	0.028320	2.374	0.028425	2.383		
2150	83.83	0.027314	2.290	0.027269	2 286		
2160	83.83	0.025999	2 179	0 025993	2.179		
2170	83 83	0.024810	2 080	0.024619	2.064		
2180	83 83	0 023126	1 939	0.023169	1 942		
2190	83.83	0.021435	1 797	0.021665	1 816		
2200	83.83	0.020109	1.686	0.020130	1 687		
>	0.000	0.146620	0.000	0 158837	0.000		
		0.969900	**69.020**	**1.0000**	**70.44**		
Base Contract Bid Price (in Product Denomination terms):			(69.02)		(70 44)		
Net Present Value (at 9.8% pa):			(59 41)		(60.63)		
+ Flat Commission (1.30%):			0.77				
= Contract Bid Price (in Product Denomination Terms):			(58.64)				
Implied Base Margin on Contract:					1.99		

CHART J2

APPLICATION SPECIFICATION	**AS AT 91.06.03.17.00.00.00**
APPLICATION ID:	**201**
APPLICATION PROMOTER:	**BLC INC**
PRIMARY APPLICATION USE:	ECONOMIC RISK MANAGEMENT
FEASIBLE COUNTERPARTY NUMBERS:	MULTIPLE COUNTERPARTIES
PRIVATE/PUBLIC USE:	PUBLIC USE
ACCEPTABLE COMMS MEDIUMS:	COMPUTER - COMPUTER LINK
RETAIL/WHOLESALE USE:	WHOLESALE USE
PRICING AND MATCHING PROCESS:	MAXIMISE PRE-TAX CONSIDERATION/ENTITLEMENT EXCHANGE RATE
CONTRACT REVALUATION FREQUENCY:	DAILY
ORDERING PARTIES ALLOWED NEGATIVE CONTRACT PAYOFFS ?	YES
APPLICATION ACCESS LIMITATIONS:	NONE

CHART J3

PRODUCT SPECIFICATION	**AS AT 91.06.03.17.00.00.00**
PRODUCT ID:	**11099**
PRODUCT SUMMARY:	
APPLICATION ID:	201
APPLICATION PROMOTER:	BLC INC
PRODUCT SPECIFICATIONS:	
MARKET:	IMMEDIATE EXCHANGE
SUB-MARKET:	NONE
MARKET TYPE:	SPOT
ESTABLISHMENT DATE/TIME:	91.06.03.17.00.00.00
MATURITY DATE/TIME:	As soon as possible after transaction initiation
CONSIDERATION/ENTITLEMENT DENOMINATION TYPE:	MONEY
CURRENCY TYPE (IF APPLICABLE):	COMMERCIAL BANK DEPOSIT
NATIONAL CURRENCY TYPE (IF APPLICABLE):	AUD and USD
MINIMUM PRODUCT DEFINITION VALUE:	Not Applicable
MAXIMUM PRODUCT DEFINITION VALUE:	Not applicable
PRODUCT STEP VALUE:	Not applicable

CHART J4

PRIMARY ORDER SPECIFICATION **AS AT 92.06.03.17.00.00.000**

ORDERING PARTY: **ABBOTTS & TAYLOR**
ORDERING PARTY REFERENCE: PQZ 260

PRODUCT:
PRODUCT ID: 11099
MARKET: IMMEDIATE EXCHANGE SUB-MARKET: NONE MARKET TYPE: SPOT
ESTABLISHMENT DATE/TIME: 91.06.03.17.00.00.00 MATURITY DATE/TIME: As soon as possible after transaction initiation

ENTITLEMENT:

DENOMINATION TYPE:	MONEY
CURRENCY TYPE (IF APPLICABLE):	COMMERCIAL BANK DEPOSIT
NATIONAL CURRENCY TYPE (IF APPLICABLE):	USD
SPECIFIED ENTITLEMENT AMOUNT:	70,000

CONSIDERATION:

DENOMINATION TYPE:	MONEY
CURRENCY TYPE (IF APPLICABLE):	COMMERCIAL BANK DEPOSIT
NATIONAL CURRENCY TYPE (IF APPLICABLE):	AUD
MAXIMUM CONSIDERATION AMOUNT:	102,900

CHART J5

APPLICATION ID: 201

ORDER SPECIFICATION PRICING

AS AT 92.06.03.17.38.02.00

PRODUCT ID: 11099

ORDER SPECIFICATION PRICING PARTY: ABRAHAMSONS [Potential Counterparty No 1]

DEFINED CIRCUMSTANCES ID: 54

COMMISSION RATE: 2.00%
DISCOUNT RATE: Not Applicable
ENTITLEMENT EXCHANGE RATE: 0.75

Feasible Product Definition Values	Net Contingent Entitlement Amounts	Component Product Prices [ID 31]	Implied Contingent Entitlement Amounts	Assessed Probabilities of Occurrence	Net Contingent Entitlement (Valuation) Amounts	Net Contingent Negative Entitlement (Valuation) Amounts	Maximum Absolute Negative Entitlement Amount
NA	(70.00)	1.0000	(70.00)	1.0000	(70.00)		
		1.0000	**(70.00)**	**1.0000**	**(70.00)**		

Base Contract Bid Price (in AUD @ 0.75 exch rate):	93 33	
Net Present Value:	93 33	NA
+ Flat Commission (1.25%):	1 17	
= Contract Bid Price (in Product Denomination Terms):	94 50	
Implied Base Margin on Contract:		· NA

CHART J6

APPLICATION ID: 201

ORDER SPECIFICATION PRICING

AS AT 92.06.03.17.38.02.00

PRODUCT ID: 11099

ORDER SPECIFICATION PRICING PARTY: **CARPENTERS** [Potential Counterparty No 2]

DEFINED CIRCUMSTANCES ID: 27

COMMISSION RATE: 1.30%
DISCOUNT RATE: Not Applicable
ENTITLEMENT EXCHANGE RATE: 0.70

Feasible Product Definition Values	Net Contingent Entitlement Amounts	Component Product Prices [ID 19]	Implied Contingent Entitlement Amounts	Assessed Probabilities of Occurrence	Net Contingent Entitlement (Valuation) Amounts	Net Contingent Negative Entitlement (Valuation) Amounts	Maximum Absolute Negative Entitlement Amount
NA	(70.00)	1.0000	(70.00)	1.0000	(70.00)		
		1.0000	**(70.00)**	**1.0000**	**(70.00)**		

Base Contract Bid Price (in AUD @0.70 each):	100.00	
Net Present Value:	100.00	NA
+ Flat Commission (1.30%):	1 30	
= Contract Bid Price (in Product Denomination Terms):	101.30	
Implied Base Margin on Contract:		NA

CLAIMS:

1. A data processing system to enable the formulation of multi-party risk management contracts, the system comprising:

input means by which an ordering party can input contract data representing an offered contract for a predetermined phenomenon, the phenomenon having a future range of possible outcomes at a time of maturity, and said contract data specifying the same entitlement for each said outcome due to the ordering party and a consideration due to a counterparty, and at least one counterparty can input registering data for said predetermined phenomena; and

data processing means for pricing and matching contracts from said contract data and said registering data, said pricing including calculating a counter consideration from each said registering data, and said matching including comparing said consideration with each said counter consideration to match an offered contract with at least one of said counterparties.

2. A data processing system as claimed in claim 1, wherein said registering data for each possible outcome is the counterparty assessed probability of that outcome eventuating at maturity.

3. A data processing system as claimed in claim 1 or claim 2, wherein the contract match is made with the counterparty having the counter consideration having the greatest difference between it and the specified consideration.

4. A data processing system as claimed in claim 1, wherein the entitlement is due at maturity.

5. A method to enable the formulation of multi-party risk management contracts, the method comprising the steps of:

(a) inputting to data processing apparatus, by input means, ordering data contract data representing an offered contract for a predetermined phenomenon, the phenomenon having a range of possible outcomes at a time of maturity, said contract data specifying the same entitlement for each said outcome due to the ordering party and a consideration due to a counterparty;

(b) inputting to said data processing apparatus, by input means, counterparty registering data relating to the range of possible outcomes for said predetermined phenomenon; and

(c) pricing and matching the offered contract, by the data processing apparatus, comprising the steps of:

(i) calculating a counter consideration from each counterparty registering data;

(ii) comparing said consideration with each said counter consideration; and

(iii) matching the contract on the basis of the comparison.

6. A method as claimed in claim 5, comprising the further step of payment of the consideration by the matched counterparty to the ordering party on matching of the contract.

7. A method as claimed in claim 5 or claim 6, comprising the further step of payment of the entitlement by the ordering party to the counterparty on maturity of the contract.

8. A method as claimed in any one of claims 5 to 7, whereby the step of matching includes selecting the counterparty having the counter consideration having the greatest difference between it and the specified consideration.

9. A method as claimed in any one of claims 5 to 8, wherein said registering data is the assessed probability of occurrence of each possible outcome, and whereby said counter consideration is calculated by the summation over all possible outcomes of the product of the respective entitlement and the assessed probability.

10. A data processing system to enable the formulation of multi-party risk management contracts, the system comprising:

input means by which an ordering party can input contract data specifying an entitlement due to the ordering party and a consideration due to a counterparty, both the entitlement and the consideration being due on match of a contract, and at least one counterparty can input counter considerations for the contract relevant to a range of possible entitlements; and

data processing means for matching a contract from said consideration and the counter consideration for the specified entitlement by comparing said consideration with each said counter consideration to match an offered contract with at least one of said counterparties.

11. A data processing system as claimed in claim 10, wherein the contract match is made with the counterparty having the counter consideration having the greatest difference between it and the specified consideration.

12. A data processing system as claimed in either one of claims 10 or 11, wherein the contract matures on matching.

13. A method to enable the formulation of multi-party risk management contracts, the method comprising the steps of:

(a) inputting to data processing apparatus, by input means, ordering party contract data specifying an entitlement due to the ordering party and a consideration due to a counterparty, both the entitlement and the consideration due on match of a contract;

(b) inputting to said data processing apparatus, by input means, counterparty counter considerations for the contract relevant to a range of possible entitlements; and

(c) matching the offered contract, by the data processing apparatus, comprising the steps of:

(i) comparing said consideration with said counter consideration for the specified entitlement; and

(ii) matching the contract on the basis of the comparison.

14. A method as claimed in claim 13, whereby the step of matching includes selecting the counterparty having the counter consideration having the greatest difference between it and the specified consideration.

15. A method as claimed in either one of claims 13 or 14, comprising the further step of the contract maturing on match.

16. A data processing system to enable the management of risk by the formulation of risk management contracts, the system comprising:

data input means by which participating parties can input data concerning at least one predetermined phenomenon, each phenomenon having a range of possible outcomes and a future time of maturity, and

data processing means, coupled to each input means, for pricing and matching contracts between participating parties, and wherein each contract is priced and matched on the basis of offering data specifying entitlements due at maturity for the range of possible outcomes for one or more of said phenomena, and registering data of the likelihood of each outcome in said predetermined range of outcomes at maturity for one or more of said phenomena, said offering data and said pricing data being derived from said participating party data.

17. A data processing system as claimed in claim 16, wherein said participating party data includes an attitude and/or objective to said one or more phenomena.

18. A data processing system as claimed in claim 16 or 17, wherein said participating party data further includes offering data and/or pricing data.

19. A method for enabling the management of risk by the formulation of risk management contracts, the method comprising the steps of:

participating parties inputting, by at least one data input means, data concerning at least one predetermined phenomenon, each said phenomenon having a range of future outcomes and a future time of maturity; and

pricing and matching contracts between participating parties, by data processing means, whereby each contract is priced and matched on the basis of offering data specifying entitlements due at maturity for the range of possible outcomes for one or more of said phenomena, and registering data of the likelihood of each outcome in said predetermined range of outcomes at maturity for one or more of said phenomena, said offering data and said pricing data being derived from said participating party data.

20. A method as claimed in claim 19, whereby said participating party data includes an attitude and/or objective to said one or more phenomena.

21. A method as claimed in claims 19 or 20, whereby said participating party data further includes offering data and/or pricing data.

22. A data processing system to enable the formulation of multi-party risk management contracts, the system comprising:

input means by which an ordering party can input contract data representing an offered contract for a predetermined phenomenon, the phenomenon having a future range of possible outcomes at a time of maturity, and said contract data specifying the same entitlement for each said outcome due to the ordering party, and at least one counterparty can input registering data for said predetermined phenomena; and

data processing means for pricing and matching contracts from said contract data and said registering data, said pricing including calculating a consideration due to the counterparty from each said registering data, and said matching including comparing said considerations to match an offered contract with at least one of said counterparties.

23. A data processing system as claimed in claim 22, wherein only those counterparty considerations that satisfy a threshold consideration specified by the ordering party are compared.

24. A method to enable the formulation of multi-party risk management contracts, the method comprising the steps of:

(a) inputting to data processing apparatus, by input means, ordering data contract data representing an offered contract for a predetermined phenomenon, the phenomenon having a range of possible outcomes at a time of maturity, said contract

data specifying the same entitlement for each said outcome due to the ordering party;

(b) inputting to said data processing apparatus, by input means, counterparty registering data relating to the range of possible outcomes for said predetermined phenomenon; and

(c) pricing and matching the offered contract, by the data processing apparatus, comprising the steps of:

(i) calculating a consideration due to each counterparty from each counterparty registering data;

(ii) comparing said calculated considerations;

and

(iii) matching the contract on the basis of the comparison.

25. A method as claimed in claim 24, whereby the step of comparing further includes accepting only those counterparty considerations that satisfy a threshold consideration specified by the ordering party.

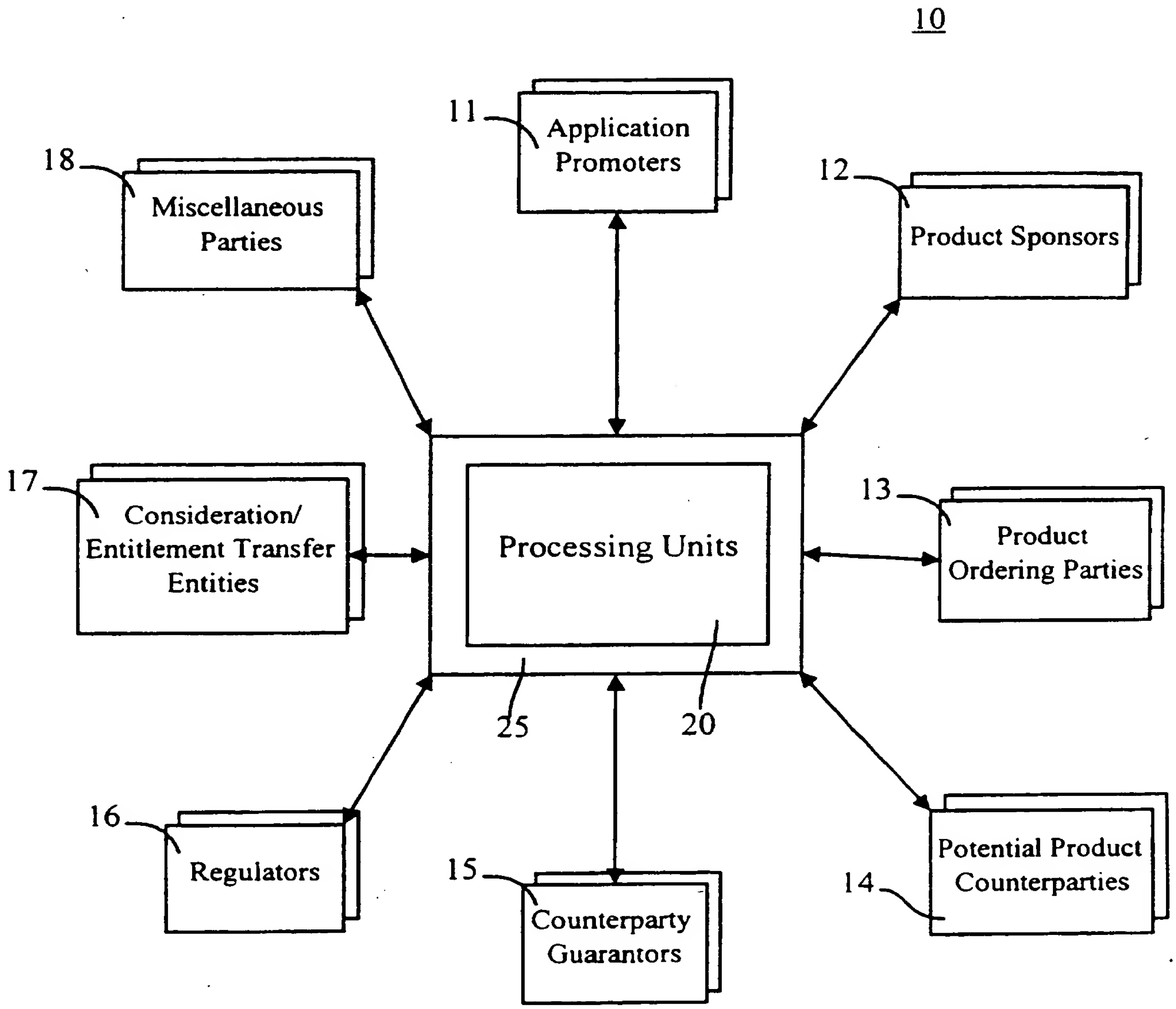
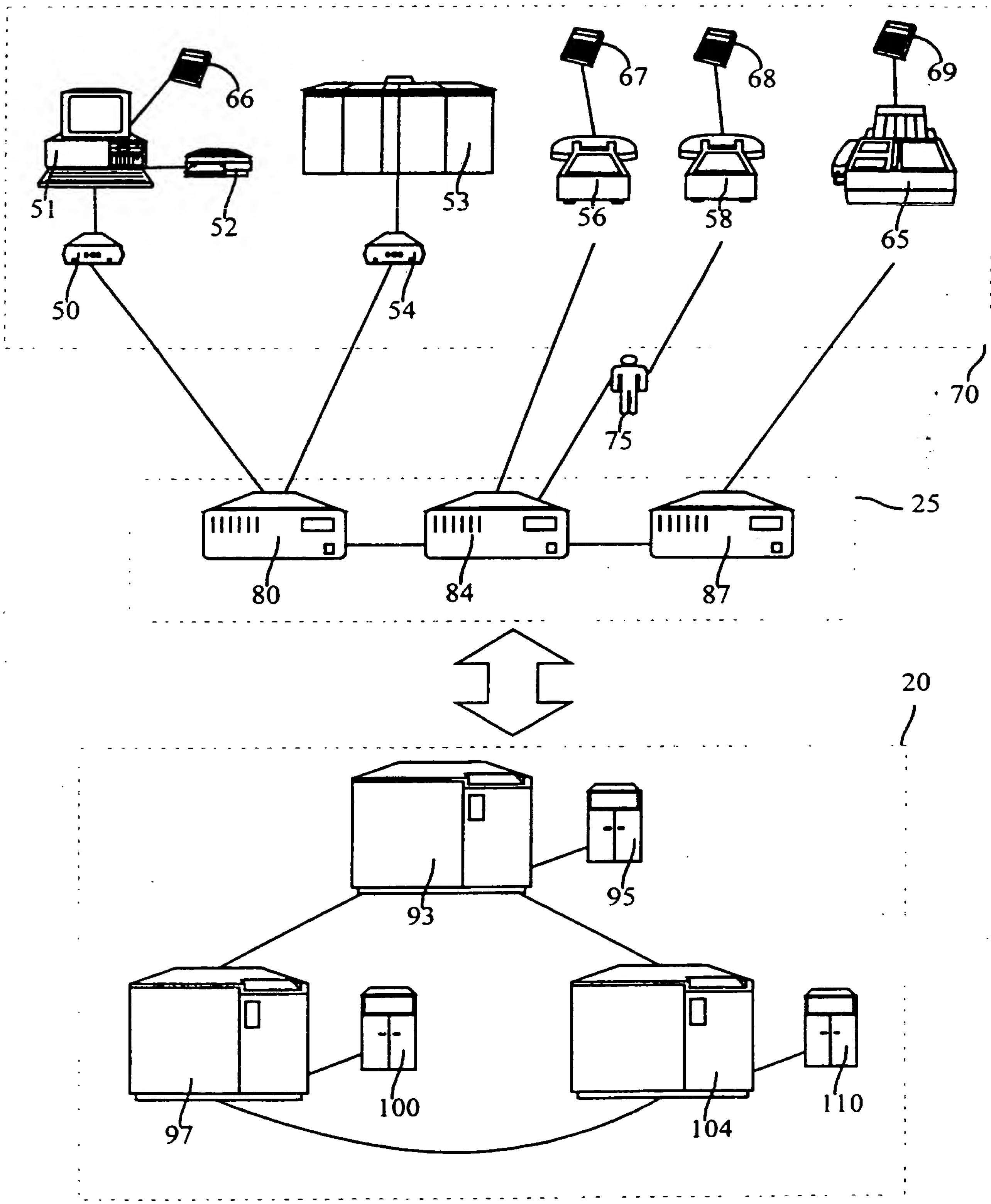

10
11
Application Promoters
18
Miscellaneous Parties
12
Product Sponsors
17
Consideration/ Entitlement Transfer Entities
Processing Units
13
Product Ordering Parties
25
20
16
Regulators
15
Counterparty Guarantors
14
Potential Product Counterparties

Fig. 1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104
110

Fig. 2a

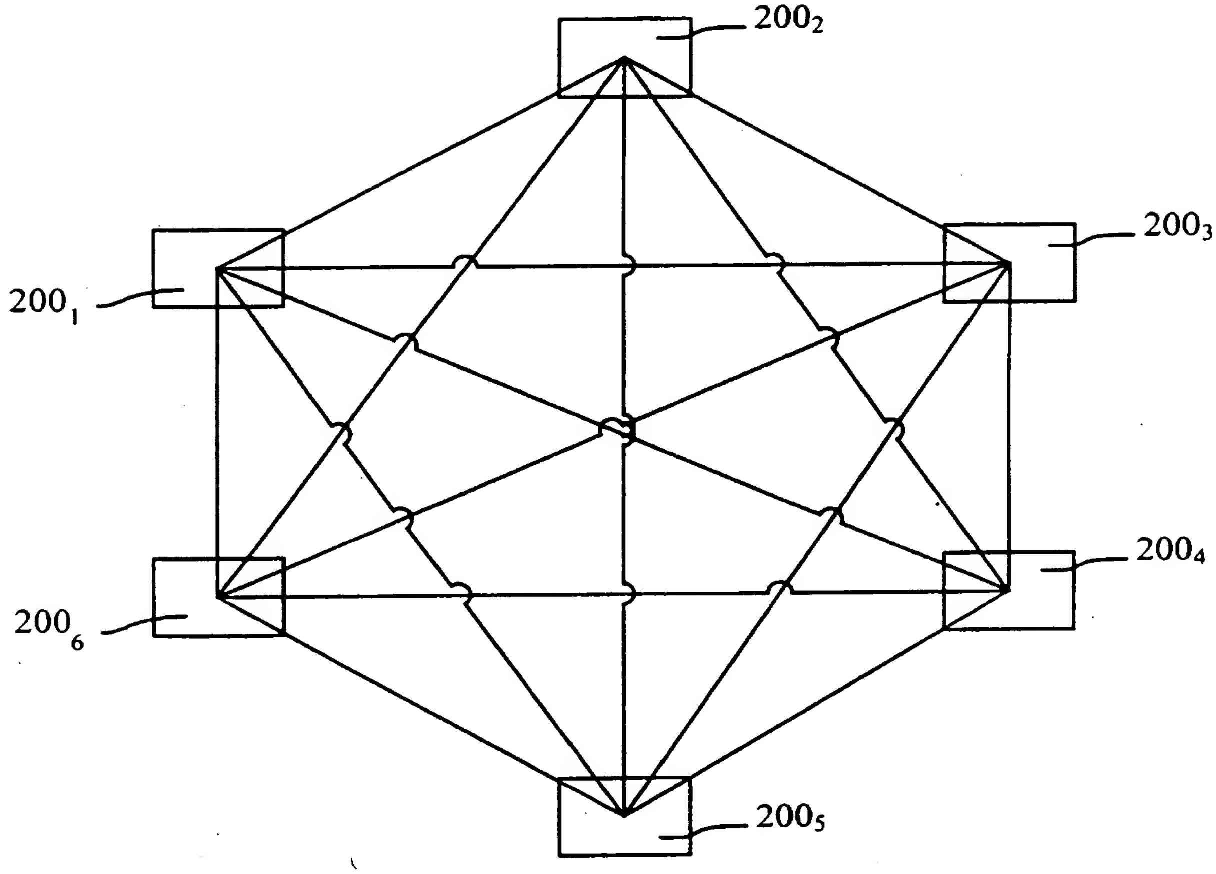


Fig. 2b

EXAMPLE 1

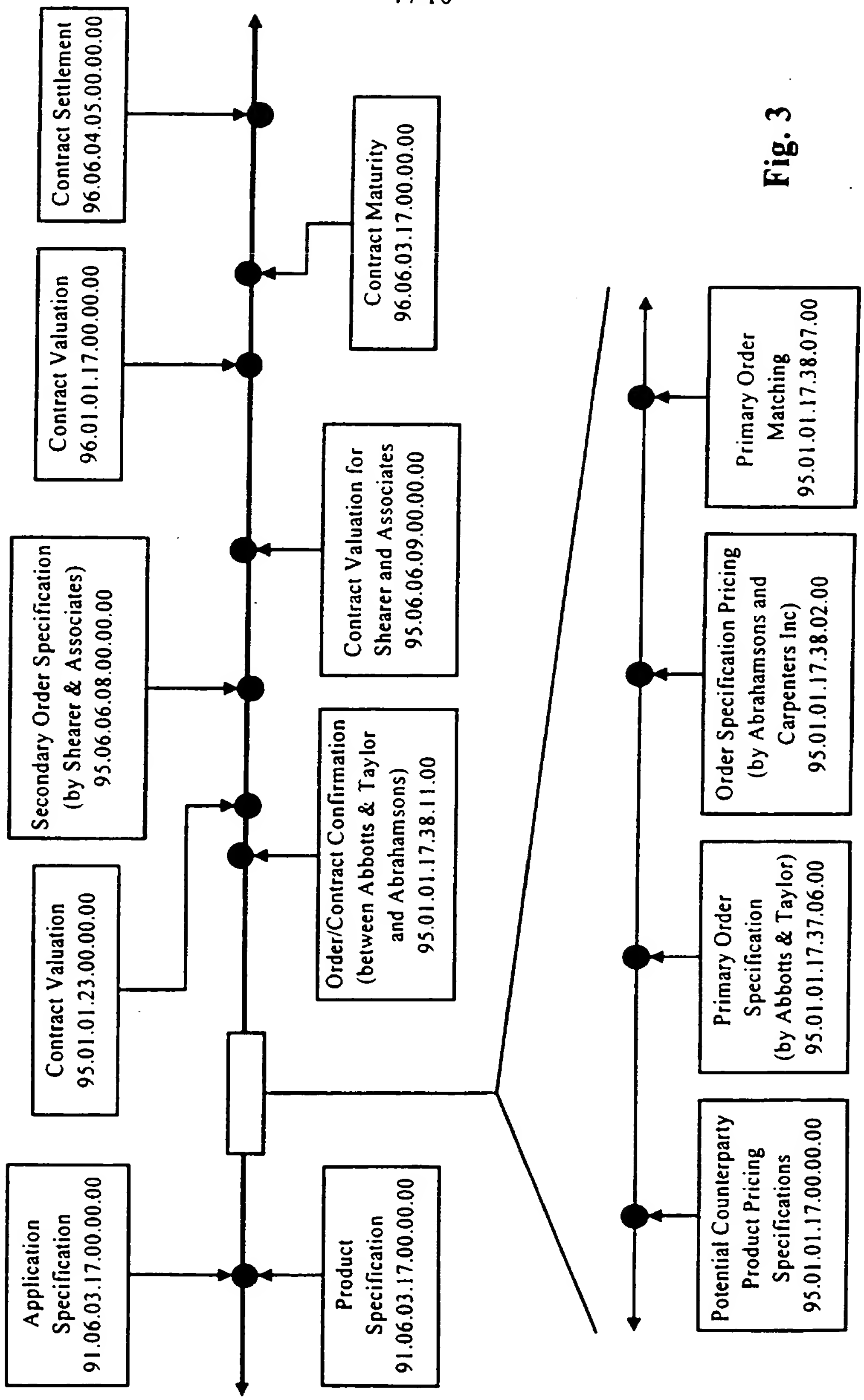


Fig. 3

EXAMPLE II

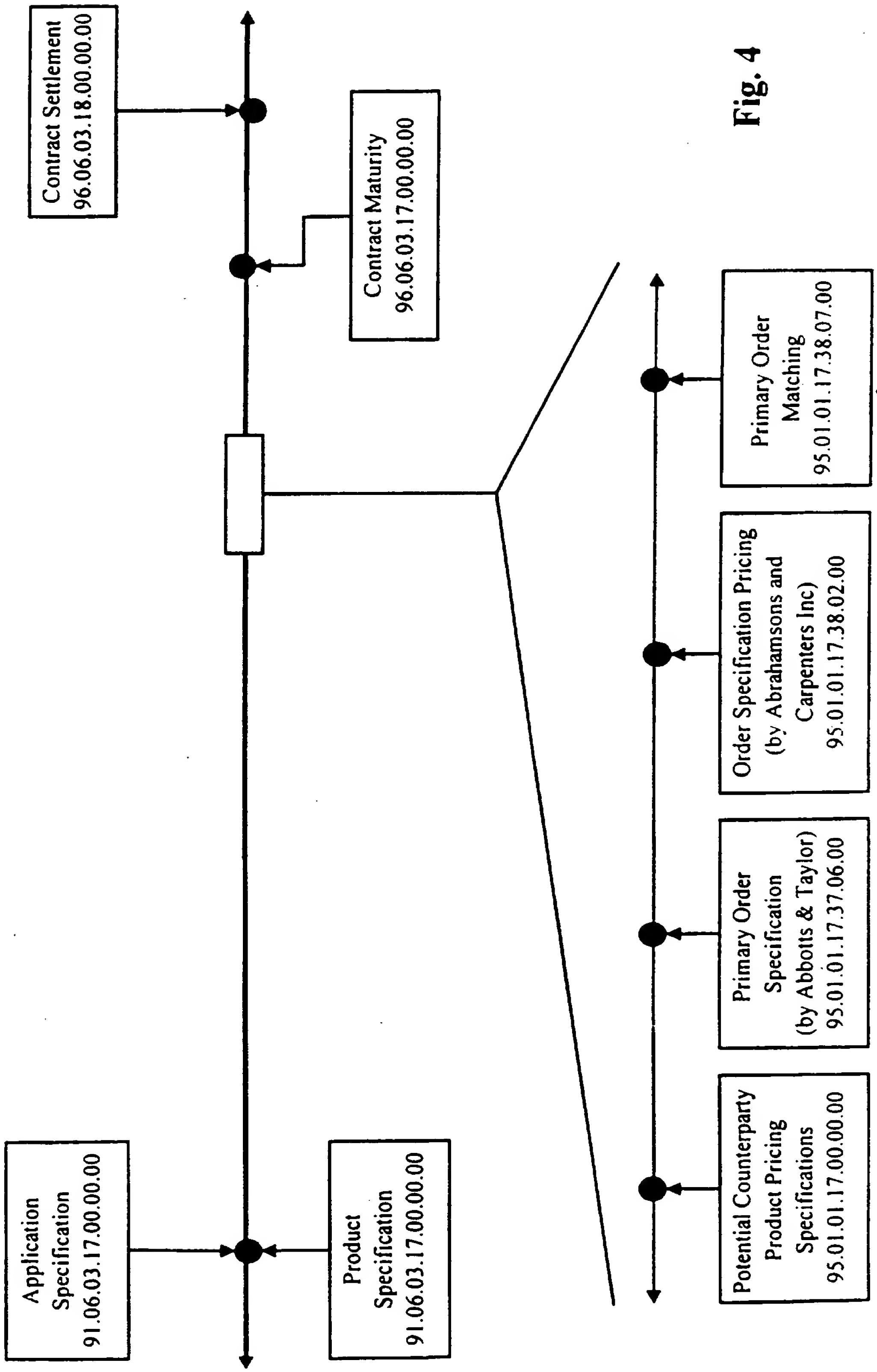


Fig. 4

EXAMPLE III

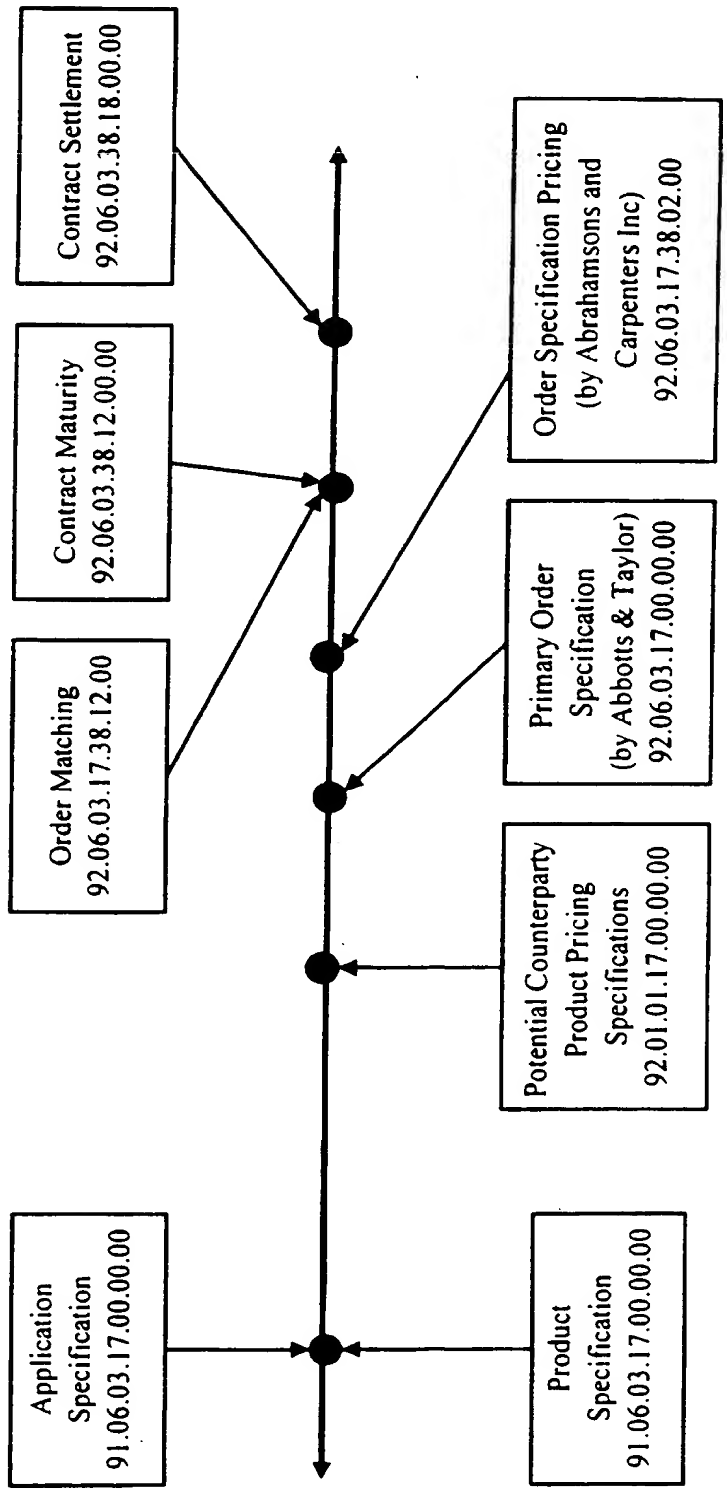
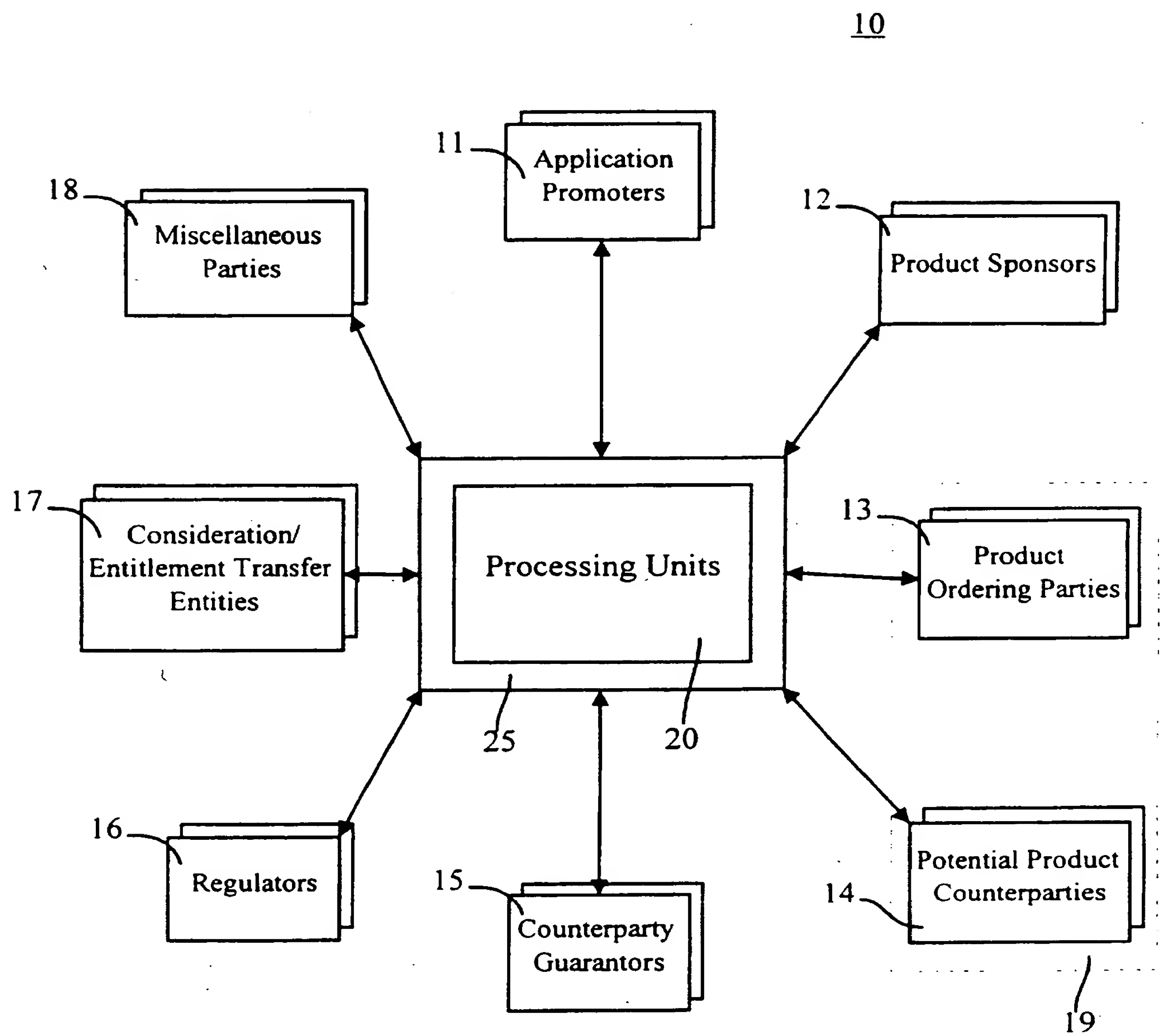


Fig. 5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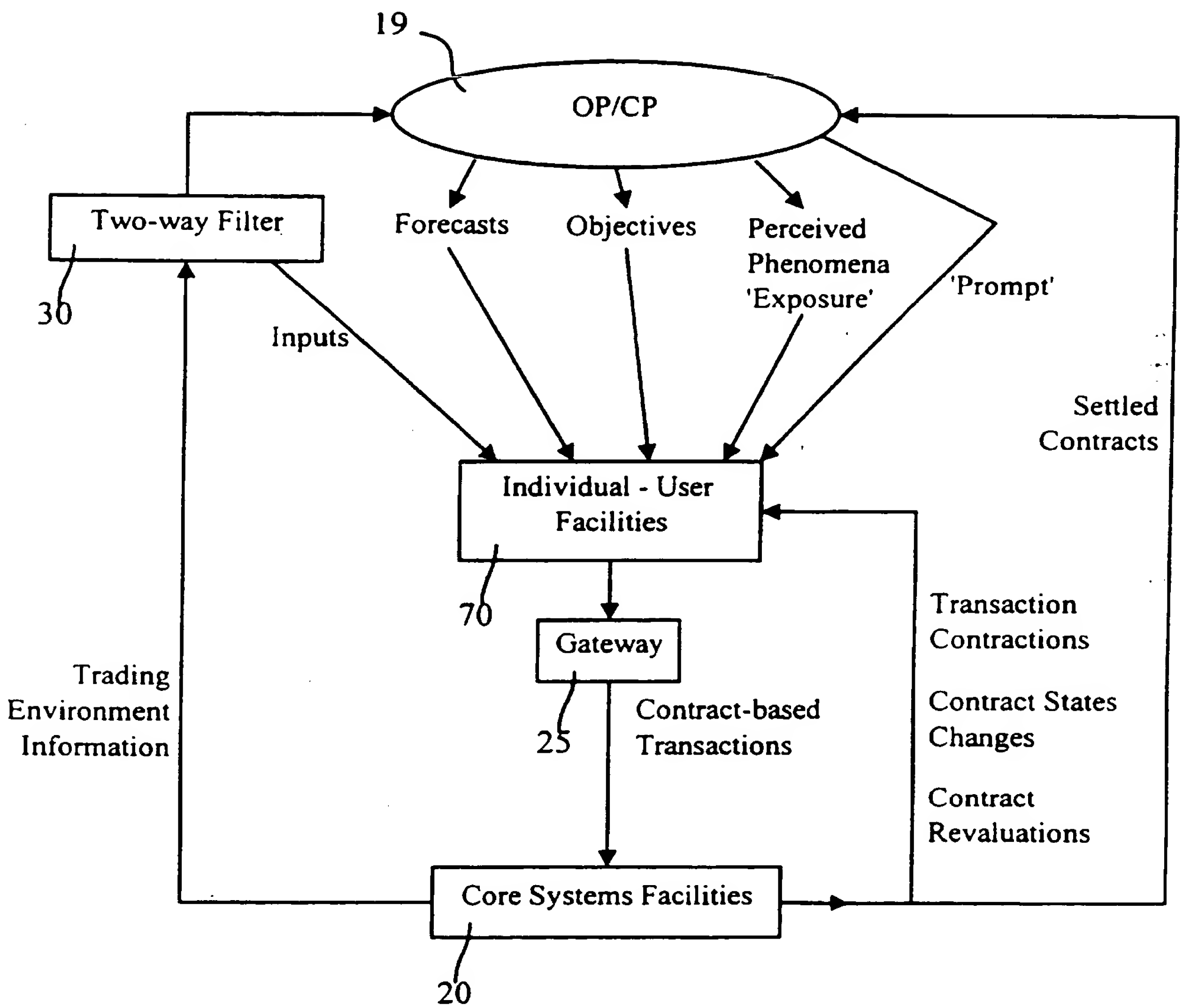
11
Application Promoters
18
Miscellaneous Parties
12
Product Sponsors
17
Consideration/ Entitlement Transfer Entities
Processing Units
13
Product Ordering Parties
25
20
16
Regulators
15
Counterparty Guarantors
14
Potential Product Counterparties
19

Fig. 6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OP/CP
Two-way Filter
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Forecasts
Objectives
Perceived
Phenomena
'Exposure'
'Prompt'
Inputs
Settled
Contracts
Individual - User
Facilities
70
Gateway
25
Transaction
Contractions
Contract States
Changes
Contract
Revaluations
Trading
Environment
Information
Contract-based
Transactions
Core Systems Facilities
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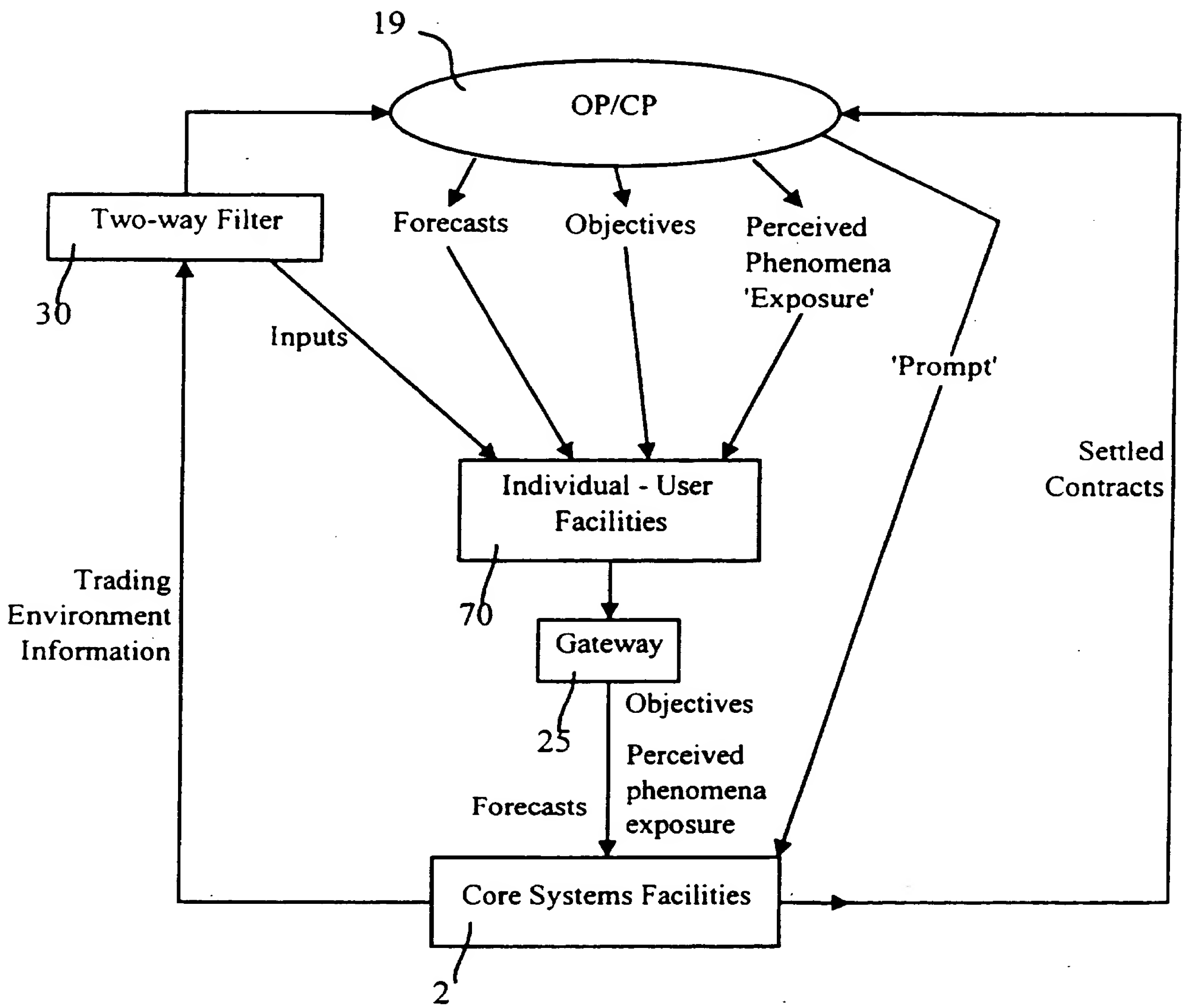
Fig. 7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OP/CP
Two-way Filter
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Forecasts
Objectives
Perceived
Phenomena
'Exposure'
Inputs
'Prompt'
Settled
Contracts
Individual - User
Facilities
70
Trading
Environment
Information
Gateway
25
Objectives
Perceived
phenomena
exposure
Forecasts
Core Systems Facilities
2

Fig. 8

Cycle #t:

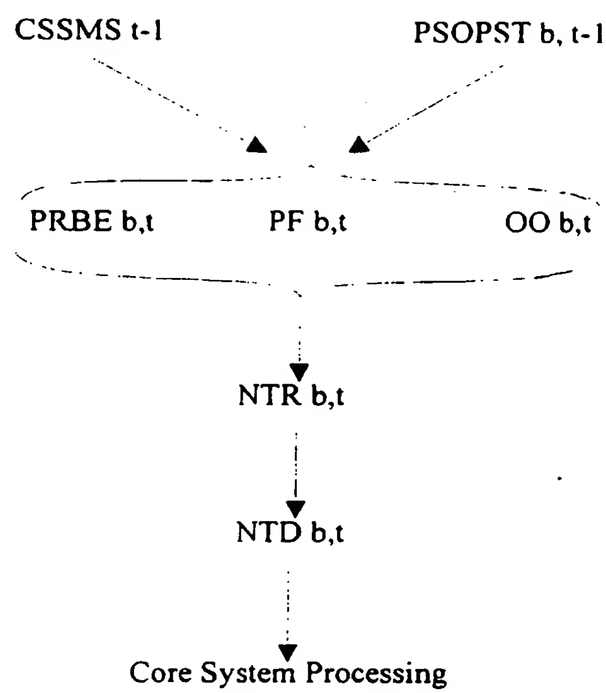
CSSMS t-1
PSOPST b, t-1
PRBE b,t
PF b,t
OO b,t
NTR b,t
NTD b,t
Core System Processing

Fig. 9

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/AU 95/00827

A.	CLASSIFICATION OF SUBJECT MATTER
Int Cl[6]: G06F 17/60	
According to International Patent Classification (IPC) or to both national classification and IPC	

B.	FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols) IPC G06F 17/60, G06F 157:00 Int Cl[5]: G06F 15/21, 15/30	
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU: IPC as above	
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)	

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	WO 94/28496 A (SHEPHERD) 8 December 1994 See the whole document	1-25
A	EP 448800 A1 (IBM Corporaton) 2 October 1991 See the whole document	
A	EP 434224 A1 (REUTERS LIMITED) 26 June 1991 See the whole document	

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed
- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
5 March 1996	26 MARCH 1996

Name and mailing address of the ISA/AU	Authorized officer
AUSTRALIAN INDUSTRIAL PROPERTY ORGANISATION PO BOX 200 WODEN ACT 2606 AUSTRALIA Facsimile No.: (06) 285 3929	R.W.J. FINZI Telephone No.: (06) 283 2213

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/AU 95/00827

C (Continuation)	DOCUMENTS CONSIDERED TO BE RELEVANT	
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4903201 A (WAGNER) 20 February 1990 See the whole document	
A	US 4831526 A (LUCHS et al) 16 May 1989 See the whole document	
A	US 4722055 A (ROBERTS) 26 January 1988 See the whole doument	

INTERNATIONAL SEARCH REPORT
Information on patent family members

International Application No.
PCT/AU 95/00827

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member	
WO	28496/94	AU	40544/93
EP	448800	JP	5035742

END OF ANNEX